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ABSTRACT

This publication describes the results of a 1992 survey of Association of Research Libraries member libraries to determine the extent to which they are becoming virtual libraries, i.e., libraries in which computer and telecommunications technologies make access to a wide range of information resources possible. Areas covered by the survey included electronic document delivery; electronic journals; full text databases; end user searching and training; network access; OPAC (Online Public Access Catalog) enhancements; cooperative development of databases and hardware; and planning, policies, services, and strategies that emphasize access over ownership. The survey showed that a majority of institutions are making notable commitments to electronic services and systems, including providing electronic document delivery services and access to electronic full text; incorporating the holdings of other libraries in their OPACs; developing campus wide information systems; and implementing policies, services, or reallocations that emphasize access over ownership. Slightly more than half of the libraries reported that they had changed or experimented with staffing patterns or organizational structure to support access to electronic information. The publication also includes a list of responding libraries; copies of planning documents describing preparations for use of electronic services from five universities; three library goals and mission statements; and documents from eight universities describing their information technology projects. (Contains 40 references.) (KRN)

SPEC

SYSTEMS AND PROCEDURES EXCHANGE CENTER

Kit 186

The Emerging Virtual Research Library

July/August 1992

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SPEC
SYSTEMS AND PROCEDURES EXCHANGE CENTER

Flyer 186

The Emerging Virtual Research Library

July/August 1992

INTRODUCTION

In describing the research library of the future, the phrase "the virtual library" has been used to describe a vision of the library of the 21st century in which computer and telecommunications technologies make access to a wide range of information resources possible. A.J. Harley, Head of Computing and Data Communications for the British Library's Lending Division, defined the virtual library in 1980 by drawing on a computing analogy. Like a "virtual machine," the virtual library gives its users the "illusion" of access to resources far greater than those actually present. In the "ultimate virtual library," the user has "access to universal knowledge without delay, at his desk."

In a January 1992 survey intended to gauge the progress of ARL libraries in realizing the virtual library, ARL library directors were asked to indicate their involvement in fourteen separate, though in some cases slightly overlapping, activities. These activities, which sought to define the essential elements or features of the emerging virtual library, encompassed electronic document delivery, electronic journals, full text databases, end-user searching and training, network access, OPAC enhancements, cooperative development of databases and hardware, and planning, policies, services, and strategies that emphasis access over ownership.

SURVEY RESULTS

Seventy-four out of a total of 109 surveys were returned and analyzed, representing a 68% response rate.

Based on the survey results, a number of institutions are making notable commitments to electronic services and systems. Sixty-three (85%) of the responding libraries are using or developing electronic document delivery services. Many libraries are experimenting with commercial services and products, such as CARL's UnCover2 journal article faxing service, FaxonFinder, a table of contents database of over 11,000 serial titles, and RLG's Ariel document transmission software. A number of libraries are engaged in projects of their own. Led by Ohio State University, the Committee for Institutional Cooperation (CIC) is experimenting with faxing journal articles over the Internet. The North Carolina State University Libraries, in partnership with the National Agricultural Library, are engaged in a two-year study of the feasibility of delivering research materials to individual researchers' workstations over local, regional, and national networks.

According to the survey, two areas not being widely addressed by libraries are digitizing of text and subscribing to electronic journals. Less than half of the responding libraries (36 or 49%) subscribe or intend to subscribe to electronic journals. A number of libraries noted that they download to disk some of the free electronic journals and newsletters available on the networks for their patrons. Others are providing access to such journals on campus information systems. Two of the responding libraries are involved in the actual publication of electronic journals. A smaller number (31 or 42%) of the responding libraries are involved in digitizing text for electronic storage, retrieval, or dissemination. Two indicated that this is being done on campus, but not by the library.

While much of this activity appears to relate to electronic document delivery, digitizing of text is also being done for preservation purposes. In the case of a few pioneering libraries, such as those involved in publishing electronic journals, digitizing of text is creating new opportunities and roles for libraries and librarians as generators and disseminators of information in electronic format. A larger number (49 or 66%) of the responding libraries provide access to electronic full text, ranging from full-text files on separate commercial systems, such as Lexis/Nexis, to full-text files on the local library's online system. Other libraries offer access to full-text databases on CD-ROM, such as UMI's Business Periodicals Ondisc, which the libraries lease. The University of Michigan has developed the UMLibText system, which provides scholars in the humanities access to software and texts for textual analysis. The system is available on the campus network and on the Internet to researchers affiliated with the university.

Training. Although training ranked high overall (64 or 86%), with respect to network information resources and tools, it appears to lag behind the technology. Almost all of the responding libraries (69 or 93%) indicated that they are connected to the Internet, but only 44 (59%) are training faculty and students in the use of Internet resources. One library noted that this is being done by computing and information services on campus instead. Another indicated that such instruction is being offered by the library in conjunction with the computing center at their institution. A larger number (55 or 74%) are training users to conduct their own database searches, an indication of the ubiquity of online library catalogs, the widespread use of CD-ROMs in libraries, and the introduction by commercial vendors of user-friendly interfaces specifically for end-user searching, such as OCLC's menu-driven FirstSearch. Sixty-five (88%) of the responding libraries said that end users had access to files both on and off campus, supporting a trend toward end-user searching.

Several of the survey questions related to OPAC features and enhancements in an attempt to measure progress toward providing users with integrated access to information through library systems. According to the survey results, a number of libraries are developing online catalogs that provide access to a wide range of information resources and services available both within the library and beyond. Sixty of the 74 responding libraries (81%) include the holdings of other libraries in their OPACs. Based on survey comments, much of this relates to either libraries' involvement in state or regional consortia or networks or a group of libraries using the same online system. A smaller number of libraries (53 or 72%) provide or intend to provide a gateway from their OPAC to external databases or networks. Five libraries noted that a gateway is provided through the campus network rather than from within the OPAC.

A number of responses (32 or 43%) said they had an e-mail interface allowing users to initiate interlibrary loan and document delivery requests, suggest purchases or ask reference questions from within the OPAC. Several libraries reported that their users can communicate electronically with the library, though not from within the OPAC.

Sixty-two (81%) of the responding libraries currently are or were involved in planning and developing a campus-wide information system at their institution. A number of libraries noted that the library's OPAC is one of several files loaded on the university's information system. Overall, the survey results suggest that the library's OPAC is evolving into one of several components of a larger, integrated campus information system.

Fifty-nine (80%) of the libraries noted that they were developing or implementing policies, services, or reallocations that emphasize access over ownership. These ranged from joint regional storage facilities, to cooperative collection development projects, to shared catalogs such as MELVYL. Several libraries reported that they have reallocated the materials budget to help finance access. Several libraries reported that they had canceled their print subscriptions to expensive reference tools in favor of subsidizing online access to these databases.

Forty-five of the responding libraries (61%) are involved in the cooperative development or purchase of electronic files or hardware. Based on survey comments, this is primarily being done through state and regional consortia, with a group of libraries sharing the cost of database licensing or purchase. Such cooperation is also taking place on some university campuses with equipment and database sharing taking place among libraries and computing services.

Organization and Staffing. Forty-one (55%) of the responding libraries reported that they had changed or experimented with staffing patterns or organizational structures to support access to electronic information. A number of libraries noted increased cooperation and coordination between the library and computing services on campus. At Temple University, the library's Scholars' Information Center, which offers networked access to bibliographic, non-bibliographic, and full-text databases as well as word processing and spreadsheet software, is co-staffed by librarians and computing and information services staff.

Coordination is also occurring at administrative levels. MIT has developed a number of committees and task forces that effectively serve to combine the libraries and campus information systems into a single group. Several libraries reported that they had reassigned staff, in most cases from technical services to public services and interlibrary loan positions, in order to meet the demands of end-user instruction and information delivery. A number of libraries noted that they had created or expanded already existing systems divisions, broadening the scope of responsibility to include access to external databases in addition to internal operations support. Several other libraries indicated that they had created new positions focusing on the provision of electronic services and on "electronic literacy" for library staff and users.

When ARL directors were asked to rank a number of areas in terms of their relative importance in creating the virtual library, they identified and prioritized a number of issues. Funding and institutional support were weighted most heavily. Other factors considered critical to the development of the virtual library were human resources, strategic planning, copyright issues, the role of electronic publishing, and the need for new organizational structures. Resource sharing, security and privacy issues, and development of new performance measures were viewed as being of lesser concern.

ISSUES AND TRENDS

Planning for the virtual library must be based on an incremental approach to ensure the successful introduction of new systems and services. It must address the integration of new services with those of the traditional print library.

This Kit and Flyer was prepared by Nancy Schiller, Engineering Librarian, State University of New York at Buffalo and was prepared as part of the OMS Collaborative Research/Writing Program.

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SURVEY RESULTS

Quick-SPEC Survey on the "Virtual Library"
TABULATION

In describing the research library of the future, expressions such as "library without walls" or "logical library" have been used. Most recently, the phrase "virtual library" has been applied to a vision of the library of the 21st century in which computer and telecommunications technologies make possible access to information in electronic format without regard to its location or to time. This Quick SPEC survey attempts to gauge progress of ARL libraries toward realizing the virtual library; to identify critical issues and changes ARL directors feel necessary to achieving the virtual library; and to identify a network of institutions moving in this direction for further contact and interaction.

TOTAL RETURNS: 74 OF 109, 68%

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1. Please check any of the following efforts your library is involved in

A. ___Use of or development of electronic document delivery services
63 total, 85%

B. ___Policies, services, or reallocations that emphasize access over ownership
59 total, 80%

C. ___Participation in cooperative development or purchase of electronic files or hardware
54 total, 61%

D. ___Participation in the development of a campus-wide information system
62 total, 81%

E. ___A written plan that states as its goal access to information from a single workstation
26 total, 35%

F. ___Enhancement of the online public access catalog (OPAC) to include the holdings of other libraries besides those held locally
60 total, 81%

G. ___Providing a gateway from the OPAC to other databases or networks, such as the Internet
53 total, 72%

H. ___End-user access to online files from on or off campus
65 total, 88%

I. ___Connection with the Internet
69 total, 93%

J. ___Training faculty and students in the use of ___Internet resources ___End-user searching
64 total, 86% 44 total, 59% 55 total, 74%

K. ___Subscribing to electronic journals
36 total, 49%

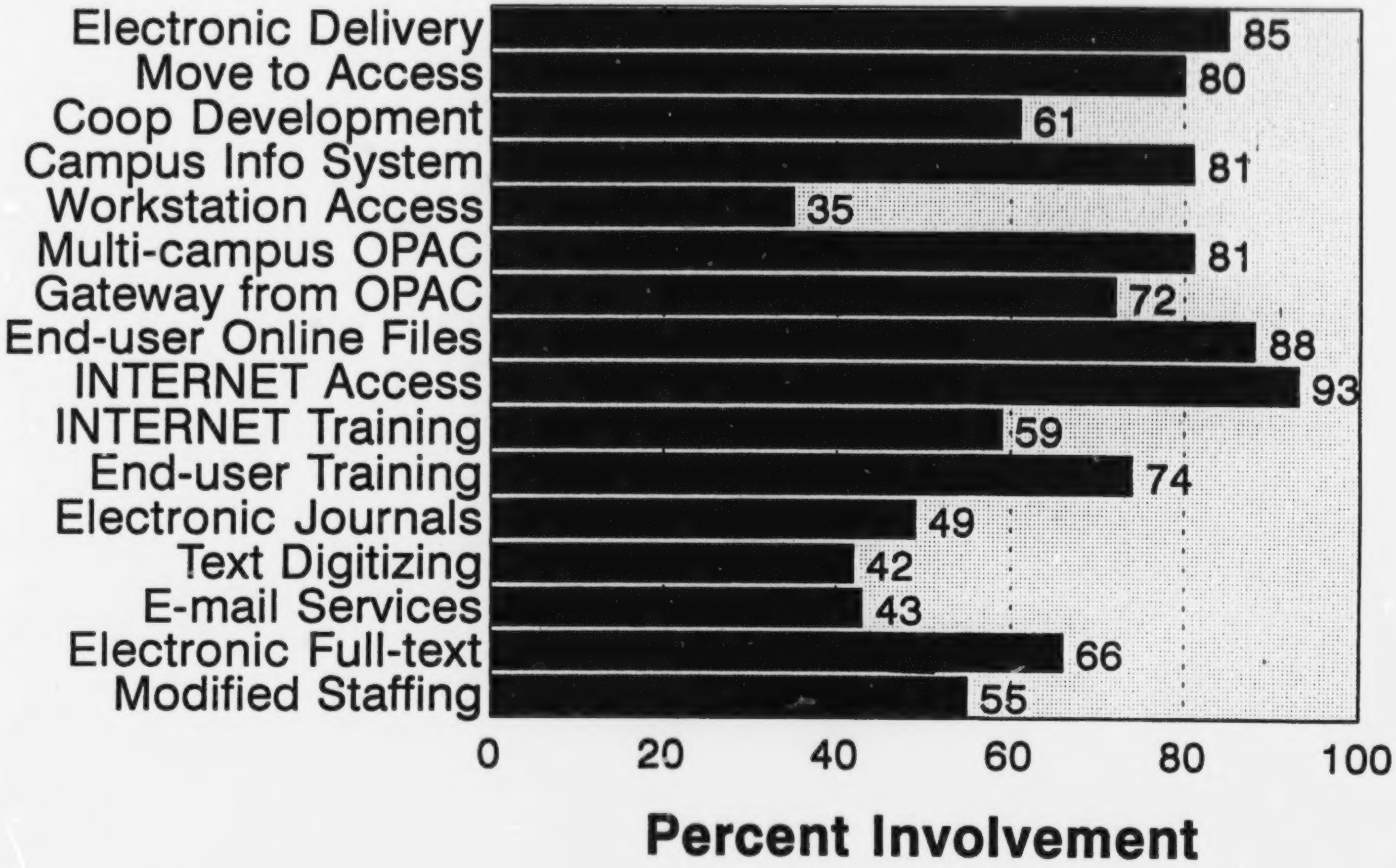
L. ___Digitizing of text for electronic storage, retrieval, and/or dissemination
31 total, 42%

M. ___An email front-end that allows users to initiate interlibrary loan and document delivery requests, suggest purchases, or ask reference questions from within the OPAC
32 total, 43%

N. ___Access to electronic full-text
49 total, 66

VIRTUAL LIBRARY SURVEY

Virtual Library Services



(Based on 74 Responses to Mailing of 109)

List of Responding Libraries

- Alabama
- Alberta
- Arizona
- Arizona State
- Brown University
- UC Berkeley
- UC Irvine
- UC Riverside
- UC San Diego
- UC Santa Barbara
- Case Western
- Chicago
- Cincinnati
- Colorado
- Colorado State
- Columbia
- Connecticut
- Duke
- Georgetown
- Georgia
- Georgia Inst. of Tech.
- Harvard
- Hawaii
- Houston
- Illinois-Chicago
- Illinois-Urbana-Champagne
- Indiana
- Iowa
- Iowa State
- Johns Hopkins
- Kent
- Kentucky
- Linda Hall
- Massachusetts
- MIT
- Miami
- Michigan
- Michigan State
- Minnesota
- Missouri
- Nebraska
- New Mexico
- North Carolina
- North Carolina State
- Northwestern
- Notre Dame
- Oklahoma
- Oklahoma State
- Oregon
- Penn State
- Pittsburgh
- Princeton
- Purdue
- Rice
- Rochester
- Rutgers
- South Carolina
- Souther Illinois
- Stanford
- SUNY Albany
- SUNY Buffalo
- SUNY Stony Brook
- Temple
- Texas
- Texas A&M
- Tulane
- Utah
- Vanderbilt
- Virginia
- Virginia Tech
- Washington (Seattle)
- Washington (St. Louis)
- Wayne State
- Wisconsin

PLANNING DOCUMENTS

Riding the Wave

University Library
Draft Strategic Plan
1990 - 1995

University of Alberta
October 1990

Riding the Wave

University Library
Draft Strategic Plan
1990 - 1995

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IV. VISION FOR THE FUTURE: THE NETWORKED LIBRARY

AN ACCESS/RESOURCE SHARING MODEL

The society around us is changing in some very fundamental ways. These changes have the potential to alter significantly the way research libraries serve their communities. In fact, libraries are at a crossroads – some say that libraries ARE a crossroads.

The Library System's ability to provide access to a substantial portion of available knowledge has been eroded by the sheer proliferation of scholarly material and spiralling costs. At the same time, technological developments, especially the rapid evolution of telecommunication infrastructures, are presenting extraordinary opportunities. The challenge to the library must be in safeguarding important traditional roles while making the best use of these new opportunities.

Seeking a New Paradigm

For research libraries there are two diverging paths, only one of which leads to the future.

In following the first path, attempting to maintain the status quo, the library strives to provide traditional physical and bibliographic access to published knowledge. However, this centuries-old paradigm of the campus library as on-site, self-sufficient repository of most resource materials breaks down as libraries confront the combined realities of cumulative and ongoing double-digit inflation for resource materials; the information explosion; and the proliferation of electronic publications.

Without massive and ongoing infusions of new funds, the library becomes incapable of meeting the evolving needs of instruction and research. And in the absence of adequate funding, the library becomes an archive of the past, largely irrelevant to scholarly research requiring current materials.

Universities cannot pretend that minor funding increases, operational streamlining through automation, or repeated collection rationalization and cancellation projects provide solutions to the structural problems of their libraries. An attempt to cling to the unrealizable goal of self-sufficiency will not only result in the stagnation of existing collections, but will cripple attempts to meet the challenges of the electronic information environment.

It has become clear that a re-thinking of how libraries achieve major goals is essential, because the old systems are no longer effective.

> *The basic problem is that the research community, and much of the rest of the society, is moving beyond the capacity of the research library. It is time to shift from the main emphasis on acquisition to an emphasis on access.*
>
> *(Frank Newman, cited in Patricia Breivik and E. Cordon Gee, Information Literacy: Revolution in the Library. New York: Macmillan Publishing Company, 1989, p. 139.)*

The new paradigm would see the library acquiring material to support the undergraduate curriculum, research at a basic level, and designated collections of strength. It would not however pretend to support all advanced research from its own collections. Institutional ownership and self-sufficiency at this margin will be replaced by inter-institutional cooperation and resource sharing.

The Cooperative Model

Cooperative collection development agreements, based on reciprocity, will underpin access to other collections which have identified complementary collections of strength. The strategy will be to achieve comprehensive access to knowledge, rather than comprehensiveness of collections.

The concept is not new. Libraries have been paying lip service to resource sharing for decades. Interlibrary lending has always played a minor but essential role in supplementing local collections. But, until recently cooperation through networks was seen as a distraction, taking attention away from a library's primary responsibilities to its own faculty and students. Today attention to cooperation is essential if a library is to provide to that primary clientele access to a vastly larger store of scholarly materials.

The enabling factors would be the assurance of resource sharing access, coupled with timely document delivery, from contractual partners. The challenge of the day is to find a means to establish effective and efficient collaboration without destroying -- or threatening to destroy -- an institution's capacity, and responsibility, to support its programmes to an agreed upon level. What kinds of restraints upon institutional autonomy are tolerable and under what circumstances?

The Resolve

The external environment at present, and that anticipated in the 1990s, is not that of the ebullient and expansive late 1960s or 1970s. Fortunately, the timely confluence of four major factors – need, technology, leadership and will – enables today's research libraries to meet the challenges in a systematic and responsible way. Need is obvious, since the clear view to the long range is austerity. Reliable, affordable technology -- not previously available -- is a vital enabling factor. Finally, a new generation of leadership is demonstrating the will to respond actively and creatively.

Today's leadership has the option of invoking new and different approaches. Most particularly, template networking mechanisms can be invoked, which will facilitate the collective capacity to serve academic clienteles. The shift from the informal collaboration of the past to the systematic, formal networked solutions of the future is the natural evolution that forms the basis of the access/resource sharing model.

It is a commonplace that institutions willingly forego some autonomy if a collaborative arrangement provides a benefit, especially a benefit not available by acting alone. They depend upon an 'exchange theory' that balances diminution of autonomy by significant advantage gained. Mutual benefit must be derived. It is to be expected that such relationships will be characterized by strong commitment to problem-solving and cooperation. Each participant is granted the right to make demands upon the other(s) and some kind of reciprocity is assumed. Each institution remains accountable to its primary clientele and its own authorizing body.

Networking does not relieve an institution of its primary institutional responsibility to maintain its local resources. Cooperation is a necessity but not a panacea. Properly conceived and properly administered, cooperation provides each partner with the capacity to support local programmes optimally while knowing that a modest incremental investment will enable confident reliance upon others for material beyond mainstream programs.

The Transformation

The paradigm shift will not be abrupt. Change will be gradual and evolutionary, with movement occurring as technological, political and financial circumstances permit. Further, for some disciplines the access/ resource sharing model will have to be adapted to take into account idiosyncratic and unique methods of research, as well as the structure of the discipline – reliance on resource sharing will vary by program. Libraries recognize that the scholar's ideal is to have 'everything' in the library. When this is not possible, technological surrogates must be put into place, to paraphrase Stanley Katz. (President of the American Council of Learned Societies, speaking to a meeting on technology and the future of scholarly exchange sponsored by the Association of Research Libraries in Providence, Rhode Island, May 10-12, 1989.)

But in all of this, the vision of the future is made possible by the wisdom of our collective pasts. It is libraries' long tradition of building collections of strength which allows them now to move into the new phase. It gives them the means to reverse the decline in their ability to support teaching and research by capitalizing on the opportunities presented by rapidly changing technology, but at the same time maintain an inter-institutional commitment to their collections, developed with such care and dedication.

The Virtual Library

Recent developments have set the stage for each library to have access to the holdings of other libraries in a network of complementary research collections which, in their aggregate, comprise a "virtual" library, or library without walls. The virtual library is much more than the sum of its constituent parts, as some of its components have extraordinary implications for the way research libraries operate.

Four technological trends are converging which open to research libraries the opportunity – some would say necessity – to redefine their role in the scholarly communication process. Because these trends build on the fruits of that massive investment in library collections, and twenty years of library cooperative processing and internal automation, the impact might be pre-emptive and dramatic.

These four key technologies which have brought the concept of the research library network into focus:

1. Online public access library catalogues (OPAC's), originally introduced to replace cumbersome card and fiche catalogues, share a standard data format in most academic libraries.

2. Distributed computing, through the proliferation of powerful personal computers, increasingly linked together and to mainframe backbones through local and wide area networks now provide access to libraries from locations convenient to the client.

3. High speed, inexpensive fibre-optic data communication networks allow for interconnecting of high speed academic computing networks across North America, Europe and Asia. Originally conceived by universities as a means to share access to supercomputer facilities for numerical intensive computing, these research networks allow transparent linkages between institutions and facilitate access to institutional catalogues, including the possibility of full-text document delivery from external databases.

   To put some dimension to the potential, the OCLC database (On-Line Computer Library Center) contains 300 million records from 8,000 member libraries in 26 countries.

4. Document delivery technology is developing powerful telefacsimile machines allowing near instantaneous transmission of documents. Questions of timeliness and standards are being quickly resolved.

In *A Statement From the Research Library Committee*, a group of senior university administrators and scholars brought together under the auspices of the American Council of Learned Societies, the Association of American Universities, the Council on Library Resources, and the Social Science Research Council, noted:

> *While a far-distant future may hold the prospect that some combination of perfectly integrated technologies will make all information personally accessible (the ultimate form of academic independence), the reality is that all of the forces at work – e.g., the rapidly growing quantity of information sources, the increasing complexity of demand, the volatility of technology, and the obvious presence of escalating costs inherent in any dynamic setting – make it essential that there be an aggressive commitment to effective collaboration. Improving the capacity to shape and use cooperative enterprises deserves full administrative attention. Here, perhaps more than in any other university effort, innovation in organization, appropriate financing, and assessment of performance is required.*
>
> *(A Statement from the Research Library Committee. Washington: Council on Library Resources, May 1990. unpaged.)*

Characteristics Of The Revitalized Research Library; a summary

Assumptions about the future must always be speculative. But, in this era of rapidly changing technology, certain directions appear clear. In order to fulfill its responsibilities to the academy, the broader community, and the scholarly world, the research library must re-orient itself in a major way.

Following are some of the characteristics which must be present in order to ensure survival.

1. Demand-driven systems.

The successful academic library is demand-driven, not supply-oriented. It begins with the specific scholarly/information needs of its clients, not the speculative acquisition and warehousing of a broad range of resources. Past library use studies indicate that a significant percentage of material acquired in research libraries is seldom if ever used. The needs of the scholar will differ by discipline and within disciplines; the library must be attuned to these differences, and will ensure a balance in collections and access which parallels the research and instruction carried out by the academic programs.

The model library for the 21st century requires the provision of access to the bibliographic records of the local collection, in the first instance, and rapid connections to other research libraries and external databases. It also requires assured and timely physical access to the materials located. Interlibrary loan services will be greatly enhanced, embracing document delivery through methods ranging from improved courier services to FAX and electronic file transfer.

2. Building on strength: the expanding margin.

The access model does not envisage a decrease in the importance of local collections or the funds necessary to support them. It does, in fact, require more attention to the rationalization and shaping of these collections.

Traditionally, research libraries supported broad-based collections to serve diverse programme needs. Interlibrary cooperation served a narrow margin of highly specialized graduate and research needs. As the building blocks for sharing scholarly resources are put in place over time, those core programs requiring local support become more narrowly defined. Thus, the margin of need met through resource sharing will expand.

While the core collection is more narrowly defined, the library's collections efforts are redirected to reinforcing its particular collections of strength. These collections are the contribution of member libraries to the strength of the virtual library. Rationalization of collections of strength among a number of institutions constitutes the only means by which libraries can continue to provide the academic community with access to the broadest range of scholarly literature.

3. Client-centered service.

While libraries have always seen themselves as service institutions, the success of the revitalized research library demands a re-orientation of its service system. Until now, the user has born the cost in time and effort of locating and retrieving materials. In the demand-driven model, the onus is on the library.

The client-centered library service units must be directed to effective service delivery, and not wedded to procedure. As these service units work more closely with their client groups, they must be capable of tailoring products and services to meet client needs more effectively.

4. Staff development and organizational change.

An organizational culture which is client-centred will demand a highly motivated, skilled, and flexible staff with a clear sense of mission and focus; a staff sensitive to changes in the information marketplace; a staff aware of new directions in scholarship. They must be liberated to experiment with new services and adapt present and emerging technologies to facilitate user access to information. The work environment must be such that creativity and development are encouraged. Organizationally, the planning period will be characterized by ambiguity and change. A necessary antecedent to client-centered service is that staff in the component libraries have the authority to develop services as they deem necessary. Accountability must reside at a level close to service delivery. Lines of authority will be fluid, structure will be less defined thus more complex, as arrangements are made to share staff expertise in a matrix environment.

5. Developing strategic alliances.

In the past, libraries have seen their cooperative efforts flounder in the face of institutional intransigence or inertia. Those reciprocal arrangements which did flourish were largely based on good will, not contractual agreements. Today's academic library leaders recognize that survival depends on their ability to develop strategic alliances. The depth of resources and quality of service available to the virtual library will depend on the breadth and strength of its contractual agreements – agreements premised on reciprocal benefit.

The building and maintenance of cooperative agreements among institutions will require a significant commitment of resources from the library, and of political will and support from the parent institution and from government.

There are two essential linkages in building the networked environment.

The first is the development of regional/provincial library networks which cut across library sectors -- universities, colleges, as well as government, public, school and corporate libraries. All libraries are links in the intellectual fabric and each has something unique to offer to the network. All have a role to play in the economic and social infrastructure, and have the potential of contributing to the academic enterprise.

Recognizing that scholarship functions in a global context, the second linkage necessarily involves forging alliances with other academic and research collections at the national and international level. This will be facilitated by the development of high-speed computer networks such as the National Research Council network (CA*net) in Canada and the National Research and Education Network (NREN) now under discussion in the United States.

6. Partnership in information literacy.

> *Instead of drowning in the abundance of information that floods their lives, information-literate people know how to find, evaluate, and use information effectively . . . Students have long relied on the knowledge of teachers and the information skills of librarians. In fact, when the volume of information was modest, they could often manage without becoming information literate themselves. What the information explosion has done is turn an old problem -- functional illiteracy -- into a new crisis. To address this crisis, we need a new educational philosophy based on a fuller understanding of the information explosion and a redefinition of literacy that includes information skills.*
>
> *(Patricia S. Breivik and E. Gordon Gee, Information Literacy: Revolution in the Library. (New York: MacMillan Publishing Company, 1989). p. 13.*

In the knowledge society, information skills are survival skills and form the basis for lifelong learning. Computer skills are just a small subset of information literacy -- students must be taught how to find, evaluate and use information effectively. The library must do its part to ensure that the graduates are competitive in an information intensive marketplace.

Librarians have always been involved in teaching information literacy. But the client-centered library will be characterized by librarians who have joined into a close partnership with faculty in the University's efforts to prepare its graduates to be full participating members in the information society. No longer set apart from the teaching, research and administrative functions, the library will become part of the teaching experience; information literacy will be integrated into the curriculum.

7. Creating the campus information network

The provision of reliable, transparent access to knowledge and information services within and beyond the library will be regarded as a utility, whose use is as common as the telephone or mail service.

The library will become an ever larger player as a node in the campus information network. Indeed, the library may function as a major catalyst in the evolution of this network, shifting today's focus on computing and hardware to the availability of resources on the network.

Into the Year 2000

Over time, the success of the new paradigm will result in greater client self-sufficiency and less in-person use of the library as place. Academic productivity will increase. As university community members become proficient at accessing catalogues and databases from their own computers, and as technological developments permit these clients unmediated access to alternate information sources (i.e. full-text electronic data-bases), some clients will bypass the library, although many of the gateways they use will have been developed by the library network to this end.

New service horizons, impossible in the past due to the library's immobility, will now be available for distance education students, the business sector, other educational institutions, government, and the wider community. The library's base of support will be broadened, and it will be able to make a larger contribution to the research and educational efforts of the province and beyond.

In a more distant future, the evolution of the library's role in developing new forms of information management and access -- building the electronic equivalent of bibliographic control -- becomes more critical than ever, and its function as a repository on the network diminishes.

> *Today much of this information is available on electronic networks accessed directly or through designated node resource centers. In the future more of this information will not reside in other libraries but be held by electronic repositories, by publishers or even by authors themselves. This is why the creation and maintenance of electronic resources will be so critical to the successful use and operation of electronic networks.*
>
> *(Mary Ellen Jacob, "Libraries and National Library Networks", Bulletin of the American Society for Information Science, June-July, 1990, p. 9.)*

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TO: ARL Colleagues

FROM: James G. Neal
Dean of University Libraries

DATE: September 19, 1991

Please find attached a DRAFT document "IU Information 2000: A Bloomington Plan." It was developed over the past year at Indiana University-Bloomington by representatives from the Libraries, Computing Services, Learning Resources, and Telecommunications.

The draft plan is being distributed across campus and the University to administrative, faculty and student groups for discussion and feedback. Several of you have asked me to share copies of the document, so I decided to send out to all ARL directors.

I hope that you will have an opportunity to read the plan and would welcome your questions and comments (JNEAL@IUBACS) as we proceed to finalize later this fall. Thanks!

JGN/cbm

Attachment

IU Information 2000: A Bloomington Plan

This two-part document describes a vision for a fully integrated campus information environment for Indiana University Bloomington through the year 2000, and five-year goals for realization of that vision. It is a draft document, and is being issued to solicit your comments and opinions. The plan will be refined based upon feedback from readers.

Why this plan is important

Over the next five years, IU will face some difficult choices. To continue to support research and deliver excellent instruction, we must carefully assess campus priorities and work cooperatively to support them. Among the issues to be explored is the degree to which the campus will require access to information resources and technology for the remainder of this decade and into the next century.

Based upon faculty, staff, and student comments and on the experience of the campus agencies responsible for delivering information resources, we project that a fully integrated campus information environment by the year 2000 is a high priority at IUB. In order to create this environment in a way that will address the needs of the campus, a great deal of integrated planning and work must take place. The goal of distributing this draft for discussion is to determine if the campus as a whole supports the vision and goals statements below.

As electronic information resources become further integrated into the fabric of scholarship and university administration, our demand for access to these resources will change. By design, then, this plan will remain dynamic. When new services and facilities are considered, the degree to which the university finds them valuable will be ascertained. Such assessments will contribute to updates and revisions to the plan and the projects that carry it forth.

I. Vision

Many faculty, staff, and students at IUB have indicated that key to fulfilling the academic mission of the campus is development of a climate for scholarship that enables broad-based communication, collaboration, and integration of the university's diverse information resources. Academicians and administrators alike have said that enhanced productivity depends upon access to information services that make cost-effective use of state-of-the-art technology. To construct an environment that will support active scholarship into the 21st century, the university's information organizations must collaboratively plan the structure of the environment, and, in partnership, implement the technologies that contribute to its creation. The major providers of information resources and technology on the Bloomington campus have prepared strategic plans for delivery of their services. This document describes a vision for using emerging technologies to integrate the information resources that are now delivered by separate campus agencies at IU Bloomington, and for inter-agency cooperation in planning and managing these services.

The foundation of this vision is based on current needs of the university community and citizens of Indiana for information integration, access, and management. The vision describes an integrated, multi-media information resource environment for the Bloomington campus. The realization of this vision, which is likely to extend over the next five to ten years, must take into account trends in funding, cost containment, technology, and demographics.

The primary elements of the future information resource environment on the Bloomington campus fall into four primary categories. Our vision includes:

- Universal access to integrated information
- Support for access and use of information
- Tools for analyzing and manipulating information
- Communication, collaborative scholarship, and administration

Each of these categories is described below.

- **Universal access to integrated information**

  Universal access to integrated information requires various technology components, all of which must be in place concurrently.

  1. *Computation and productivity on the desktop workstation.* By the mid- to late-1990s, IUB students, faculty, and staff will use the desktop workstation in two primary modes: as a desktop computer, providing computational and productivity services; and, for an increasing number of scholars, as the primary information access device. As the types of information that can be transmitted via digital media increase, the value of the computer for information access will be felt, and the ability to integrate information in different media will be critical. Before the end of the decade, academicians may need the ability to access information in various media for their research and instructional activities. Their desktop workstation must have the capacity to process voice transactions and video display, as well as digital text, electronic mail, file transfer, computation, and graphic design. Indeed, on the Bloomington campus of Indiana University there already exists a wealth of information in a variety of media, and we expect this to increase substantially in the next decade and beyond.

  2. *High-performance shared resources at our fingertips.* Full integration of desktop workstations into the scholarly world depends upon the availability of sufficient and cost-effective shared computing resources that meet the university's applications and performance needs in the areas of research, teaching, and administration. These shared resources include on-campus computers and network access to either on- or off-campus supercomputers.

  3. *High-speed access to scholarly and institutional information.* While libraries and other information-delivery agencies now provide many online catalogs and indices, shortly they will also provide an increasing number of full-text resources in digital form. Once these reference materials are made available, users must be able to easily transfer full text, image, and sound among faculty offices, classrooms, and information resource providers. For instance, in a search of online periodicals, a faculty or staff member might discover a document that includes both text and graphics. For purposes of research or instruction, the user might wish to transfer it to a paper-based duplicating service across campus. To do this, the user needs access to the high-speed communications network and sophisticated software. Or, a member of the campus community might want to transfer video- or CD-ROM-based data across the communications network from the Libraries or the Audio-Visual Center to the screen of a classroom or office workstation. As the number of full-text databases available throughout the world continues to grow, faculty, students, and staff will require access to similar resources at other institutions. Such access is imperative for collaborative scholarship, including instruction, literature reviews, and text-based research. Similarly, access to administrative information will

enhance the efficiency of central and departmental administrators, the quality of decision-making, and the effectiveness of faculty in their capacity as student advisors.

4. *The ability to find and filter information.* Advances in information technology will, without careful management, provide us with too much unfocused information. An effective information environment for the Bloomington campus will include the ability to filter data to identify those elements of interest to each individual. Users will have access to computer-based tools for filtering data that can be tailored by the individual. In addition to these filters, which are passive tools that limit the incoming stream of data, the campus will also need finders, or active tools that search specified information resources for data or information. For example, a user could employ a finder to automatically search an online catalog of Audio-Visual Center videotapes and movies each month for new listings on a specified set of topics and report the titles to the user.

- **Support for access and use of information**

The information resource environment must include a support structure that enables effective access and use of the resources. This structure will provide comprehensive training and consultation for members of the campus community to allow them to obtain maximum benefit from investments in information resource technologies. It will include training and assistance in use of information access and data analysis tools. Subject matter experts will consult on the use of discipline-specific information resources. This support structure will include both centralized and decentralized consultation.

An integrated support service will be staffed by experts conversant in all information media (video, voice, paper, graphic, and digital). Distributed expertise for support of these technologies and tools will be cultivated by the information resource and technology providers in cooperation with academic and administrative departments. Additionally, emerging information resource technologies will be employed to provide distributed consulting and training. The campus-wide communications network, the Internet, full-text/image transfers, expert systems, online documentation, and sophisticated help systems will all be used to provide extensive support at the information resource user's location.

- **Tools for analyzing and manipulating information**

Simply providing access to information is not sufficient to meet the needs of users of the campus information resources. Raw facts are not truly useful until they are converted into higher order information through manipulation and analysis. This information can take the form of text, images, voice, etc. The tools used for this conversion are also essential elements of the information resource technology environment. The Bloomington campus in the 1990s will see continuous improvements in the effectiveness and efficiency of tools such as database management software, electronic spreadsheets, graphics tools, programming languages, statistical and mathematical analysis software, hypermedia software, library catalog access systems, administrative application systems, and executive information systems. These tools will be easy to learn and use, will be distributed to the workstation for maximum flexibility, will be pervasive across the campus, and will be able to be customized by the user.

- **Communication and collaboration**

Faculty and students report that the effectiveness of instruction has already improved significantly as a result of electronic mail, campus- and university-wide networks, and the placement of network-connected workstations in proximity to the work place and classroom. The remainder of this decade will see these benefits grow in number. Perhaps even more important than the impact on individual communications is the impact on collaborative scholarship that will be made possible by emerging technologies.

Advances in information resource technologies are changing the nature of scholarly collaboration. The interconnection of nearly 475 universities and colleges in over 81 countries via the Internet, and the widespread use of electronic mail and file transfer among institutions, makes sharing scholarly information simple and inexpensive. Using the Internet for co-authorship of articles, papers, and research, an activity that has already begun, will become commonplace. Sharing information via the Internet will be integrated with other technologies. Video and audio conferencing, voice mail, electronic bulletin boards, collaborative authoring software, and hypermedia are some of the tools that potentially will be used.

Because many faculty, student, and administrative projects are carried out by teams from multiple departments, the university community will benefit from current and emerging information resource technologies that enhance collaboration. Even the simple yet time-consuming task of arranging meetings is made more efficient through electronic communications coupled with calendaring software. Group decision support systems software and teleconferencing will enhance effectiveness as people carry out the work of the institution.

To achieve the stated vision for the Bloomington campus information environment, the following goals have been set forth by the campus information service providers.

II. Five-Year Goals

FOUNDATIONS. These goals describe the elements of the information and technology infrastructure that must be in place to support universal access to integrated information, support for that access, tools for analyzing and manipulating information, and communication, collaborative scholarship, and administration at Indiana University Bloomington.

1. *Workstations.* All IU Bloomington students, faculty, and staff will have access to workstation technology appropriate to their work when and where they need it.

   a. All IUB faculty and staff will have office workstations adequate to their needs.

   b. Most IUB students will own workstations.

   c. Public computing facilities will provide workstation and instructional computing access to students who do not own a workstation, to those who must use high-level or special-purpose workstations and software that are not economically feasible to own, and to faculty and staff who need a workstation while away from their office.

2. *Shared computing resources.* Sufficient and cost-effective shared computing resources that meet the university's applications and performance needs in the areas of research, teaching, and administration will be available. These shared resources include on-campus computers and network access to either on- or off-campus supercomputers.

3. *Ubiquitous communications network.* A ubiquitous communications network of sufficient performance and reliability will exist to facilitate all information technology needs of Indiana University. This includes:

   a. Sufficient network capacity to manage the traffic of all university-owned campus workstations.

   b. Sufficient network capacity to manage the traffic of all dormitory workstations and those faculty-, staff-, and student-owned workstations in off-campus housing.

   c. Continual enhancement of the performance and reliability of the network to meet evolving information technology needs of Indiana University . This may require an order of magnitude expansion in performance at all levels of the network over the next five years.

   d. Maintenance and enhancement of the current levels of data connectivity, and expansion of connectivity to include other technologies (e.g. video), as appropriate.

4. *Information access policies and procedures.* Develop policies and mechanisms to enable access to information the university wishes to make available to the academic community. This information includes: 1) official institutional data, library databases, and published works, and 2) informal information concerning research and academic works in development.

   a. Develop and distribute catalogs that describe the information available to the academic community.

   b. Develop policies and procedures, including media specifications, for how this information will be accessed, who is entitled to access, and how information may be used.

   c. Develop guidelines for managing and storing the information to assure integrity, consistency, and ease of access.

5. *Computer proficiency and information proficiency.* Develop and offer programs and services to faculty, staff, and students to ensure proficiency in computer technology and information literacy. Students will be assured of opportunities to develop computer literacy and information literacy during their enrollment at IU.

SERVICES. These goals describe the elements of the information resource environment that must be in place to support user needs for access and use of information and to provide tools for analyzing and manipulating information.

1. *Integrated support.* An integrated support structure for faculty, students, and staff will be created, comprising a network of human resources and electronic information. This structure will support all information media (video, voice, paper, graphic, and digital).

2. *Network-based information tools and services.* Expand information about and access to information that is available over the network, including general and discipline-specific electronic conferences and bulletin boards, tools to facilitate collaboration in research and in publication of research results, and "finders" and "filters" to allow focused access to information sources on the network.

3. *Access to library information and databases.* Fulfill the goals of the library automation project (Information Online, or IO), including but not limited to:

    a. Successfully implement the basic IO modules.

    b. Expand the information sharing and document delivery system throughout IU, the State, and the North American research library community.

    c. Expand the bibliographic database to include all holdings of the IU Libraries and other organized collections of the university.

    d. Provide access to a large number bibliographic, statistical, full-text, multi-media, image, and sound databases over the campus network.

4. *Access to institutional data.* Expand and improve access to Indiana University institutional data. Establish policies and procedures to enable access, ensure data integrity, and prevent unauthorized use. Implement mainframe and distributed relational database management systems, and develop mechanisms to provide support services to users of institutional data.

5. *Access to multimedia tools.* Multimedia tools and materials with a consistent user interface will be made available to IUB faculty and staff. Additionally, they will be made available in half of all IUB classrooms by 1995.

LEADERSHIP. These goals describe elements of the cooperative working relationship among the information technology organizations required to fulfill the vision, and the resulting leadership position that will emerge for IU.

1. *Cooperative research and development.* Providers of information technology services at IUB will cooperate and collaborate to establish joint research and development projects in the areas of video, data, and voice technologies.

2. *Leadership through cooperative planning.* Through cooperative, inter-agency planning, provide coherent leadership for the campus and university in the area of information technology. This effort will demonstrate leadership in cross-agency cooperation to plan, implement, and manage

information technology services. These efforts will yield minimized duplication of resources and reduced costs. Plans will reflect local standards for information delivery media, formats, and sources that are based on national standards.

3. *National and statewide influence.* Achieve national and statewide influence and leadership for Indiana University in the area of information technology through increased exposure to IU accomplishments in the professional and general news media; publications and conference presentations by Indiana University faculty and staff; successful grant applications; leadership positions in professional and scholarly organizations; recognition in the form of awards, citations, and invitations; participation on national technology standards-setting boards; and invitations to IU visitors to observe and discuss developments and accomplishments.

IU LIBRARY ELECTRONIC TEXT RESOURCE SERVICE (LETRS)

[LETRSDOC.DF4: rev. of November 7, 1991 "Proposal for the establishment of a Center for Electronic Texts in the Humanities"]

I. Basic Proposal

This proposal recommends the establishment of an IU Library Electronic Text Resource Service, to be located in the Research Collections tower of the IUB Library. Such a service would serve to focus the efforts of IU faculty, staff, & students concerned with advancing the use of computing at IU for teaching and research in the Humanities. Within the environment outlined by the Academic Computing Planning Committee's Computing in the Humanities Subcommittee, the establishment of this service offers a feasible and effective way to begin achieving the many goals and objectives listed by the Subcommittee. The basic approach attempts to maximize the benefits, while minimizing the costs, associated with innovation by building on current structures and established procedures and by working collaboratively to build coalitions among existing organizations, rather than by starting yet another independent project that would compete for limited resources. It is recommended, therefore, that the service be developed in stages, initially located on the main floor of the Research Collections and administered by the Reference Department in cooperation with other library departments and university agencies. Similar facilities already exist at other universities, including Columbia University Libraries' *Electronic Text Service* and the *Center for Electronic Texts in the Humanities* established by Rutgers and Princeton Universities.

A detailed description of recommended resources for a first stage is given below. An outline of general requirements for a second stage is also provided with a few specifics. The ultimate goal of phase three (achievable to a limited extent in phase two), is to provide a fully networked, distributed resource. It is too early to attempt any description of exactly what types of hardware and institutional structures would be required to support such a resource or to speculate about its scholarly content and uses. However, by beginning immediately, we will put ourselves in a position to more easily identify scholarly needs and resources that need to be distributed. In addition, we will be building the extertise and collaborative structures needed to support scholarly endeavors wherever they may be located.

II. Current Situation

A. IU Libraries: Up until now the IU Libraries have concentrated on automating bibliographic databases that are used to locate texts and data indexed by those databases. Specific library support for humanities computing currently consists of providing access to bibliographic data about IU Library holdings via IO and to bibliographic data about the periodical literature via CD-ROM indexes & abstracts (such as the Humanities, MLA, Philosophy, and Religion Indexes, located at and serviced by the Reference Department). In addition, the IU Libraries and UCS cooperatively provide access via the AIE: a) to one full-text database (ARTFL); b) to the OCLC, & RLIN national bibliographic databases; c) to other library catalogs; d) soon to journal tables of contents via CARL's UNCOVER servicer; and e) to various electronic forums (such as PACS-L and the HUMANIST).

B. **IU Computing Services:** Likewise, IU's University Computing Services have concentrated on: a) developing a campus wide information services network; b) on providing public access to this network via public computing facilities (whose microcomputer workstations concomitantly provide public access to microcomputer based resources); c) on providing technical assistance and computing facilities to IU administrative, teaching, and support departments for special projects (such as the library's own automation project); d) on offering advice and instruction to all members of the university community regarding the purchase and use of standard hardware and software products; and e) on providing for the purchase of standard software at reduced prices by means of group academic discounts and site licenses. Specific UCS support for humanities computing (in addition to the cooperative efforts with the library listed above) consists of: a) support for the Oxford Concordance Program on the VAX; and b) inclusion of some humanities disciplines in the Distributed Support Pilot Project (which provides specialized support to an academic department, school, or group of departments that wishes to participate on a partnership basis).

C. **New Developments:** Recently, the IU Libraries have begun to acquire additional types of materials in machine-readable formats (primarily CD-ROM), whose content can be accessed and output electronically by end users (see "Compact Disk Products: Source List" recently published by the IUB Libraries). As can be seen from the source list, these machine-readable materials have been purchased and supported by those library units already supporting similar materials in non-machine readable formats. These include: statistical databases such as the *1990 Census of Population and Housing* located in the Government Publications Dept, and *Hydrodata* located in the Geology Library; graphical data such as the *Electronic Atlas of Arkansas*, located in the Geography Library, and *SuperMap USA*, located in the Business/SPEA; and, full-text references sources, such as the *Grolier Electronic Encyclopedia*, located in the Undergraduate Library and the *Oxford English Dictionary CD-ROM* in the Reference Department. Electronic texts in the humanities are just beginning to be acquired. As with print and microform materials, they are being cooperatively identified for purchase by funds managers in consultation with faculty. For example, the complete works of Goethe on disk are currently on order by the German Studies Fund, and the Classics Fund Manager has indicated a desire to purchase the complete canon of classical Greek works (the *Thesaurus Linguae Graecae*).

D. **Unmet Needs:** However, no one has yet taken on the responsibility for providing the university community with systematic information about what electronic materials are actually available, for assisting members of the university community in their use of scholarly texts in electronic form, for facilitating access to the text management software needed by scholars who work with electronic resources, and for providing the overall support required if such texts and software are to be effectively integrated into teaching and research. Given this need, it is suggested that the library develop a new facility in Research Collections under the general supervision of the Reference Department, and in cooperation with other relevant departments that have responsibility for acquiring and supporting materials and tools in the humanities and social sciences. Such an approach is suggested for the following reasons: 1) the Reference Department already has the basic hardware and collection resources upon which such a facility must build; 2) it also has a staff that is knowledgeable about resources in the humanities, is experienced in using electronic sources, and is interested in advancing the state of the art in humanities teaching and research; 3) the main library continues to provide the most central and accessible location on campus for scholarly resources in the humanities and social sciences; and 4) it also provides the rich concentration of research materials and human experts needed to effectively support an electronic text service.

III. Specific Overall Objectives

A. **Cooperatively Develop Collections of and/or Facilitate Access to:**
   1. Machine-readable primary texts & databases
   2. Software for textual research & teaching
   3. Reference sources on humanities computing

B. **Cooperatively Develop A Central Library Workstation Site for Accessing Electronic Text Resources:**
   1. Stage one: Offer appropriately configured stand-alone PC's to provide local access to individual resources
   2. Stage two: Load appropriate resources on Reference Department's CD-ROM LAN to provide local access to multiple resources
   3. Stage three: Work with IUB/UCS's developing "Program for Distributed Computing" to provide campus wide, decentralized access to multiple resources

C. **Cooperatively Offer Services in Support of Research and Teaching that Use Electronic Texts:**
   1. Group workshops and demonstrations on resources and their use
   2. Prepared materials on resources and their use that would be made available in a variety of formats (print publication, online hypertext help files, etc.)
   3. Individual consultations on resources and their use
      a. On demand at service points
      b. By appointment
   4. Facilitate identification and acquisition of affordable humanities computing tools for use by researchers, staff, students, & teachers--i.e. quality scholarly shareware, specialized commercial products with academic discounts, etc.

D. **Cooperatively Produce Knowledge Management Tools Utilizing Unique LETRS Resources.**

Initially such tools and products would focus on integrating bibliographic data from a variety of sources. For good reviews on similar approaches to serving this research need see "Environmental Information Resources and Electronic Research Systems (RRSs)", by Timothy C. Weiskel and "Downloading from the OPAC", by Stuart Spore on pages 7-20 and 69-80 respectively of Library Hi Tech, Vol. 9, No. 2 (1991). Examples of possible IUL products would include:

1. Basic tools produced regularly for general use, e.g. bibliographies downloaded from electronic sources such as IO and prepared for electronic or print distribution.
2. Customized tools produced contractually for specific uses, e.g. helping a scholar to take an existing, extensive bibliography developed in a older electronic format and converting it into a more usable, publishable one.

IV. Recommended Development of Resources in Three Stages

A program of support for electronic texts in the humanities will need to be developed in stages. Relatively simple and inexpensive measures that will bring significant improvement to the current situation may be taken immediately. During this first stage, a minimal but useful collection of texts, software, and hardware can be acquired and basic service provided in the area between the subject catalogs and the reference department offices. It would be hoped that resources for this could be allocated by the end of 1991 and service could begin on March 23, 1992, after Spring Break. A second stage could then begin on July 1, 1992 with the new fiscal year and future plans for development of the service integrated into the overall library and university planning process.

The electronic texts listed below represent a collection of basic resources that will operate effectively in the existing MS-DOS dominated library and departmental environment. Minimal additions to and upgrading of existing hardware (also listed), plus the purchase of some basic software packages and reference tools will thus allow these texts to be utilized in a manner that should result in an exponential increase in humanities computing capabilities. Such capabilities have not been readily available on campus previously because the existence of such materials was not well-known, there was no mass demand for them, and no agency has taken responsibility for supporting them. A few of the items listed below already are owned, have been requested, or are on order. Where relevant, expansion and upgrade options for stages two and three are mentioned. Specifically, items marked with [A] are presently available at IU or are "on order"; those marked with [F] are on order or are recommended for purchase in the first stage; and those marked with [S] are recommended for purchase during the second stage or soon thereafter.

Descriptions of listed materials can be found in many sources, but the single best source for accurate, succinct information is The Humanities

Computing Yearbook 1989-90: A Comprehensive Guide to Software and other Resources, ed. Ian Lancashire (Oxford: Clarendon Press, 1991), which also provides the context needed to understand the relation of cited materials to each other and to the current state of the art of humanities computing. Thus, each item below has a short reference--of the form (HCY91_p###)--to its primary citation in The Humanities Computing Yearbook, followed by the cost of a single, academic copy--of the form [$###]--where available and relevant. These prices should only be taken as a very general estimate of the costs needed to provide a base budget. Various group purchase discounts and site license possibilities exist for nearly all the items listed that could significantly modify actual costs.

A. **Machine-readable Text Files:**
  1. Networked, remote online access (mounted at non-IUB site)
     a. [A] ***ARTFL*** Corpus of French literature (accessible currently via AIE) (HCY91_p254-55)
     b. [A] ***Dartmouth's "Dante" & "Shakespeare"*** databases (also currently available) (HCY91_p274)
     c. [A] ***CARL's "Uncover"*** (journal tables of contents soon to be available via AIE)
  2. Networked, local online access (mounted at an IUB site)
     a. [S] IBM/Notis platform (using MDAS or BRS IR system)
     b. Other platforms (RS 6000, NeXTstation, etc.).
        (1). [S] ***The Oxford English Dictionary, 2nd ed.***, for example, is available on magnetic tape. It uses a suite of text management programs from ***Open Text System*** Inc. (section IV. B. 6. b. below) which run on the UNIX operating system of most hardware platforms (including Intel 80386 machines)--needs 550Mb of disk storage. [$10,000]
        (2). [S] Likewise, Chadwyck-Healey's recently announced ***English Poetry Full-Text Database*** is available in tape form (at $49,000 for the complete database) or on CD-ROM (at $41,000). Both versions come with three copies of complete database and are licensed for unlimited institutional site networking.
  3. CD-ROM (Stand-alone or LAN)
     a. [F] ***The WordCruncher Disk (CD-ROM).*** Contains: Riverside Shakespeare; King James & New International Bible; Library of American texts; and US Constitution Papers. Requires ***WordCruncher*** program. (HCY91_p245) [$240].
     b. [F] ***PHI/CCAT CD-ROMs.*** Originally required Ibycus Scholarly Computer for Support--now runs at greatly reduced cost on standard 80386/VGA & Macintosh machines. Currently, the most cost effective and sophisticated software for supporting these is *LBase*. The results of analyses using *LBase* can then be output to a multilingual word processor such as ***MLS*** or ***NB Lingua*** (B. 6. a. & B. 2. d-e. below).
        (1). Disk #1 1986: Writings from 44 classical Latin authors, a body of Greek inscriptions, plus biblical and other materials from the Center for Computer Analysis of Texts at the U. of Penna. (HCY91_p29-30,535) [$25]

(2). Disk #2 1989: Materials from "Duke Documentary Papyri Data Base Project (DDBDP). (HCY91_p535) [$25]

c. [F] ***Thesaurus Linguae Graecae (CD-ROM).*** Comprehensive corpus of Classical Greek literature, 800 BC - 700 AD. Texts are encoded in special "Beta Code". Requires a software program such as *LBase* to utilize (see *PHI/CCAT* entry IV. A. 3. b. above). (HCY91_p211) [$500/5 yr. license] See also: Theodore F. Brunner, "The Thesaurus Linguae Graecae: Classics and the Computer," Libraries and the Humanities in the 1990's, Eds. Fred Batt and Charles Martell,. Spec. issue of Library Hi Tech 9:1 (1991)

d. [F] ***Perseus Project (CD-ROM).*** Macintosh-based "hypertextual database of textual and visual materials for the study of classical Greek Civilization." Elli Mylonas, "An Interface to Classical Greek Civilization," JASIS: Journal if the American Society for Information Science 43:2 (1992), 192-201. (HCY91_p209-10)

e. [S] ***CDWord.*** MS-DOS hypertext browsing and searching system on CD-ROM containing 14 different texts--bible editions and dictionaries. (HCY91_p23) [ca/ $600, but less with academic discount]

f. ***Oxford English Dictionary.*** (HCY91_p154-55)

  (1). [A] First edition on CD-ROM, already in Ref.

  (2) [S] Second edition on tape using *Open Text Systems*- (see IV. A. 2. b. (1.) above & B. 6. b. below).

g. [S] ***English Poetry Full-Text Database.*** Includes 4,500 volumes of poetical works prepared in a Standard General Markup Language (SGML) scheme based upon the Text Encoding Initiative (TEI) and based upon the poets listed in The New Cambridge Bibliography of English Literature. (recently announced, see IV. A. 2. b. (2.) above.) [offered as a complete set at $41,000 or in three parts: 600-1660 ($12,000); 1661-1800 ($12,000); and 1801-1900 ($21,500)--includes MARC records for all 4,500 volumes]

4. Disk/tape (on stand-alone PCs for 1st stage)

  a. [A] ***Goethe, Werke.*** (Electronische Bibliothek zur Deutschen Literatur). Niemeyer. ISBN 3-484-38501-4: On order for Germanic Studies fund. Requires *WordCruncher* software. [$800]

  b. [S] ***Past Masters.*** Several sets of classical texts (with English translations) in the Humanities: Locke-Berkeley-Hume; Utilitarians; Political Philosophy; Economics; Continental Rationalists; and Kierkegaard. Distributed by InteLex with run time version of Folio Views software. (HCY91_p373-75) [$1650 for whole series, 50Mb of text]

B. Software:

1. BIBLIOGRAPHIC DATABASE MANAGEMENT

  a. *IBID.* (see *Nota Bene/Linqa* in IV. B. 2. e. below)

  b. [S] ***Library Master.*** MS-DOS/PC recently marketed competitor to Pro-Cite. Used by IU's Workshop in Political Theory and Policy Analysis Library. (HCY91_p400) [$180]

c. [F] *Pro-Cite PC&MAC v.2.0x)*. Over 100 copies of this bibliographic database manager already have been purchased by IU faculty, staff, and students along with conversion Biblio-Links for IO, OCLC, and other electronic sources. Several existing sources, such as Social Sciences Citation Index on CD-ROM, also have a built-in "export to Pro-Cite" option. Any data that can be converted into an ASCII file, delimited with commas between "fields" and quotes surrounding non-numeric fields can be imported into Pro-Cite; punctuation files can be customized to output Pro-Cite data in just about any format desired. The new version has overcome previous search speed, user option, and interface limitations. We already have a beta version for MS-DOS and will be acquiring the Macintosh version soon. (HCY91_p399-400) [$250]

2. COMPOSITION, EDITING AND PUBLISHING

a. [F] *Book Index Builder*. MS/DOS shareware program written by Peter Norton. (HCY91_p414) [available in PC-SIG library]

b. [S] *CINDEX*. Widely used by American editors of literary and historical books. MS-DOS/PC version of mainframe program is available for the Newberry Library. (HCY91_p415) [cost unknown]

c. [F] *EDITOR*. MS-DOS/PC composition tool and style checker recommended by MLA, and available form Academic Software Library. (HCY91_p82) [$50]

d. [F] *Multi-Lingual Scholar*. MS-DOS/PC, graphic based, multi-featured academic editing and word-processing focused on support of non-Roman alphabet languages, version 4.0 has just been released. (HCY91_p419-20) [$450]

e. [F] *Nota Bene*. MS-DOS/PC character based, multi-featured, academic editing & word-processing, version 4.0 is just being released. IU has previously purchased multiple copies of NB ver. 3.0 at academic discount, one of which is licensed to SALC in the IU Libraries. (HCY91_p420-21) [$400 includes all modules; LETRS will be receiving a FREE full copy for research & demonstration purposes]

(1). Includes "back-of-book indexing" (3 levels)
(2). Includes ORBIS (textbase management)
(3). IBID (bibliography management module extra)
(4). LINQUA (this module adds full multi-language, non-Roman alphabet capabilities)

3. COMPUTATIONAL LINGUISTICS AND TEXT ANALYSIS

a. [F] *GRAMmarCracker*. MS-DOS/PC English sentence parser for applications in computational linguistics and artificial intelligence applications. (HCY91_p37) [$50]

b. [F] *Micro Text-Analysis System (MTAS)*. MS-DOS/PC shareware developed at Toronto University's Centre for Computing in the Humanities (CCH). to perform complex lexical analysis. (HCY91_p499) [$15]

c. **[F]** ***MicroEYEBALL.*** MS-DOS/PC implementation of EYEBALL mainframe style analysis program. (HCY91_p502-03) [distribution media & postage costs only--$10]

d. **[A]** ***Oxford Concordance Program.*** Currently available in mainframe version on VAX cluster. (HCY91_p486-88) [single station MS-DOS/PC Micro-OCP version costs $295, was available previously at UCS Ballantine computing site]

e. **[F]** ***TACT.*** Sophisticated shareware textual analysis program developed at Toronto University's Centre for Computing in the Humanities (CCH). Can analyze texts in all scripts except ideographic languages, such as Chinese, and those that read left to right, such as Arabic. Primarily used for content and thematic analysis, including concordance generation (HCY91_p495-96) [$25 for printed manual]

4. TEXT FILE CONVERSION AND FILTERING

a. **[F]** ***Auto Import.*** A template based filter program for automating transfer of data from one format into another, particularly useful for taking downloaded ASCII files (including those taken from IO and other AIE sources, and translating them into various database and textbase formats for personal, scholarly use. (discussed on PACS-L, sold by White Crane Systems, Norcross, GA) [$170]

b. **[F]** ***Word for Word.*** Converts word processed files in a large variety of formats, marking unconvertible features (HCY91_p425) [$130]

5. TEXT PROGRAMMING LANGUAGES

a. **[F]** ***ICON.*** Public domain program for a variety of hardware platforms. Main applications in the humanities are for the analysis of natural language text, stylistic analysis, grammatical tabulations, formatting, and text utilities. (HCY91_p451-52) [$15-25 for program, or free via anonymous FTP over the INTERNET; $30 for printed reference manual; $40 for printed implementation description]

6. TEXTBASE MANAGEMENT SYSTEMS

a. **[F]** ***LBase.*** Supports analysis of electronic texts several formats, including most importantly those of the TLG and the PHI/CCAT databases. It also easily exports data to various multilingual, scholarly word processors, in particular both Nota Bene and Multi-Lingual Scholar. (HCY91_p480-81) [$350]

b. **[S]** ***Open Text Systems*** (also see *OED 2nd ed.* note). Produces a suite of SGML based text management software programs: "PAT" is the basic indexing, search and retrieval system; "LECTOR" displays marked-up text in real time on an X-Window terminal; and the "TRANSDUCTION TOOLKIT" is a grammar based conversion program for texts prepared with various markup formats. "GOEDEL" is a new program that will implement a comprehensive text-management system, while the "EDITOR'S WORKBENCH" will integrate all four of these programs to support group editorial operations on large databases of multiple documents. (HCY91_p437,511) [$2000, for a single academic workstation; $14000 for a networked institution site license running on a 386 server with Unix, or $40,000 for VAX9000 server with Ultrix]

c. [F] *ORBIS* (see *Nota Bene/Lingua* in IV. B. 2. e. above).

d. [F] *WordCruncher*. Text-indexing, analysis, concordance, & retrieval software used to prepare and management texts such as I.A.1. &2. above--v.5.0 will also support SGML coded texts), to be purchased by Reference Dept. directly from Electronic Text Corporation. (HCY91_p438-39) [$200].

7. Summary Estimate of First Stage Software Costs
   - a. Bibliographic Database Management: $250
   - b. Composition, Editing and Publishing: $900
   - c. Computational Lingusitics and Text Analysis: $100
   - d. Text File Conversion and Filtering: $300
   - e. Textbase Management Systems: $550

C. **Staff:**

A Graduate Student Assistant for 15 hrs/week would be needed in the first stage to assist current library staff in organizing the software, maintaining the equipment, scheduling use, and preparing instructional materials. If possible such an assistant should be hired for a one year period from Jan. - Dec. 1992. (Total cost would be around $4500 for 50 weeks at $6.00/hr). Later staff needs would depend how the proposed service develops.

D. **Hardware:**

1. Stage One
   - a. One PC 486-33 workstation:
     - (1) 486-33/50MHz CPU with 4Mb RAM
     - (2) 1.2MB 5¼ & 1.44MB 3½ floppies
     - (3) 213MB (15ms) hard drive
     - (4) SCSI CD-ROM interface card & two internal SCSI CDROM drives
     - (5) Internal 88Mb 5¼ removable hard drive
     - (6) 17" NEC5FG full page flat screen VGA monitor
     - (7) ATI/VGA display card with 1MB RAM & mouse
     - (8) Ethernet card: "network ready" for 2nd stage
     - (9) 2 serial, 1 parallel, 1 game port
     - (10) 101 Extended Keyboard
     - (11) MS-DOS 5.0
   - b. One Macintosh IIci workstation:
     - (1). Two external SCSI CD-ROM drives
     - (2). 68030 25MHz CPU/68882 with 5Mb RAM
     - (3). 1.4 Mb 3½ floppy,
     - (4). 240Mb Hard Disk
     - (5). Two external SCSI CD-ROM drives
     - (6) External 88Mb 5¼ removable hard drive

North Carolina State University

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Photocopy Services (919) 737-7098

NCSU Digitized Document Transmission Project: Improving Access to Agricultural Libraries

- Collaborative project between North Carolina State University Libraries, NCSU Computing Center, the National Agricultural Library and twelve land-grant university libraries.
- Test the transmission of digitized research materials via national, regional and local telecommunications networks.
- Improve access

ABSTRACT

- NCSU Libraries in partnership with the National Agricultural Library (NAL) is leading a research and demonstration project that is investigating the technical, procedural, and administrative issues related to the electronic delivery of digitized research materials via the NSFnet/Internet.
- Commercially available graphics-capable, networked desktop computers, scanners, and laser printers have been installed in participating institutions' interlibrary loan departments for the direct transmission and receipt of digitized page images.
- Images of documents can be delivered directly to a researcher's computer, placed on diskette or printed.
- Digitized images are far superior to telefacsimile transmissions.

INTRODUCTION

NCSU Libraries, the NAL and the NCSU Computing Center are collaborators in a research project exploring techniques for electronic receipt, display, distribution, and output of digitized page images from agricultural research materials. The cooperative project is a two-year research and development effort supported in part by a Title II-D grant from the U.S. Department of Education, an Apple Computer, Inc. equipment grant, and participating institutions.

The project includes fourteen land grant libraries representing most of the regional networks in the Internet. (See figure 1: Network Connections). Universities taking part in the project are Clemson, Iowa State, Michigan State, NCSU, North Carolina Agricultural and Technical State University, Ohio State, Pennsylvania State, Utah State, Virginia Polytechnic, Washington State, and the Universities of Delaware, Maryland at College Park and Minnesota at St. Paul.

DESCRIPTION OF THE PROJECT

Background

The current project builds upon a demonstration study on the transmission of digitized images conducted from April 1989 through September 1990 jointly by the NAL, the NCSU Libraries, and the NCSU Computing Center in conjunction with the NAL's National Agricultural Text Digitizing Project (NATDP). This project represents the beginning of the third phase of the three-phase NATDP initiative launched by the NAL in 1987.

The first two phases of the NATDP consisted of a cooperative project involving the NAL and forty-two land-grant libraries to test scanning hardware and indexing/search software systems for capturing full text and images in digital format for publication via media such as CD-ROM discs, optical discs, or digital video discs.

Project Management

The project management comprises a team of six persons from NCSU Libraries and the NCSU Academic Computing, including the Director of Libraries, the Libraries' Assistant Directors for Library Systems and Public Services, the Associate Provost for Academic Computing, the Director of the Computing Center, and a project manager. The project team, working closely with the NAL and its National Agricultural Text Digitizing Project Advisory Panel employed the established nomination and review mechanism to solicit applications and select the participants for the expanded project.

Project Objectives

The project objectives are fivefold:

- to explore and evaluate technical, procedural, administrative, and user response issues involved in bringing digitized document delivery to a substantial community of researchers;
- establish libraries as stakeholders in developing the national research and education network;
- investigate copyright law pertaining to electronic document delivery services;
- examine issues related to selecting hardware platforms for delivering documents using network technologies;
- carry out a comprehensive publication and conference program to widely disseminate the project results.

Technical Design

Participating libraries digitize documents using commercially available scanners and non-proprietary machine-independent formats (initially Tagged Image File Format (TIFF) and others as required).

The earlier pilot study demonstrated that by adhering to standards applied to data format and data communications, such as the TCP/IP protocol suite used by computers in the Internet, and

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by utilizing off-the-shelf equipment, it is possible to integrate dissimilar computing environments in libraries and research areas.

The transmission of images and electronic mail exchange is made possible through the standard TELNET/FTP capabilities of the TCP/IP protocol suite. Scanned image files are compressed for transmission using low-cost compression programs for the Macintosh. The Macintosh environment is the supported environment for the project. However, the system is not machine dependent as was demonstrated in the pilot study where NAL, by installing standards-compliant hardware and software to connect its customized DOS-based digitizing system to the Internet, was able to transmit and receive digitized images from NCSU Libraries. The system will accommodate both DOS and UNIX equipment that meets performance requirements.

Workstation Configuration

The technical design is not limited to the digitization of printed materials. The application can be used to transmit, receive, view, and manipulate any machine-readable material libraries may wish to provide, including multi-media materials such as video. The Macintosh configuration outlined below is the supported environment for the purposes of this project.

Mac IIsi, 40 meg disk drive	$2,452.00
2-meg memory upgrade	99.00
IIsi NuBus expansion board	176.00
Monochrome monitor	291.00
Extended keyboard	167.00
Apple monitor stand	63.00
Abaton 300 GS scanner	1,030.00
Abaton scanner kit	259.00
Personal Laserwriter NT	2,176.00
Hardware subtotal	*7,613.00*
Word processor	120.00
White Knight communications	85.00
TIFF image editor program	150.00
Stuffit Deluxe compression	63.00
SuperPaint	95.00
Networking contingency	500.00
Super Laser Spool	85.00
NCSA Telnet	
System Interface (under development)	N/A
Software subtotal	*1,098.00*
Grand Total	**$7,811.00**

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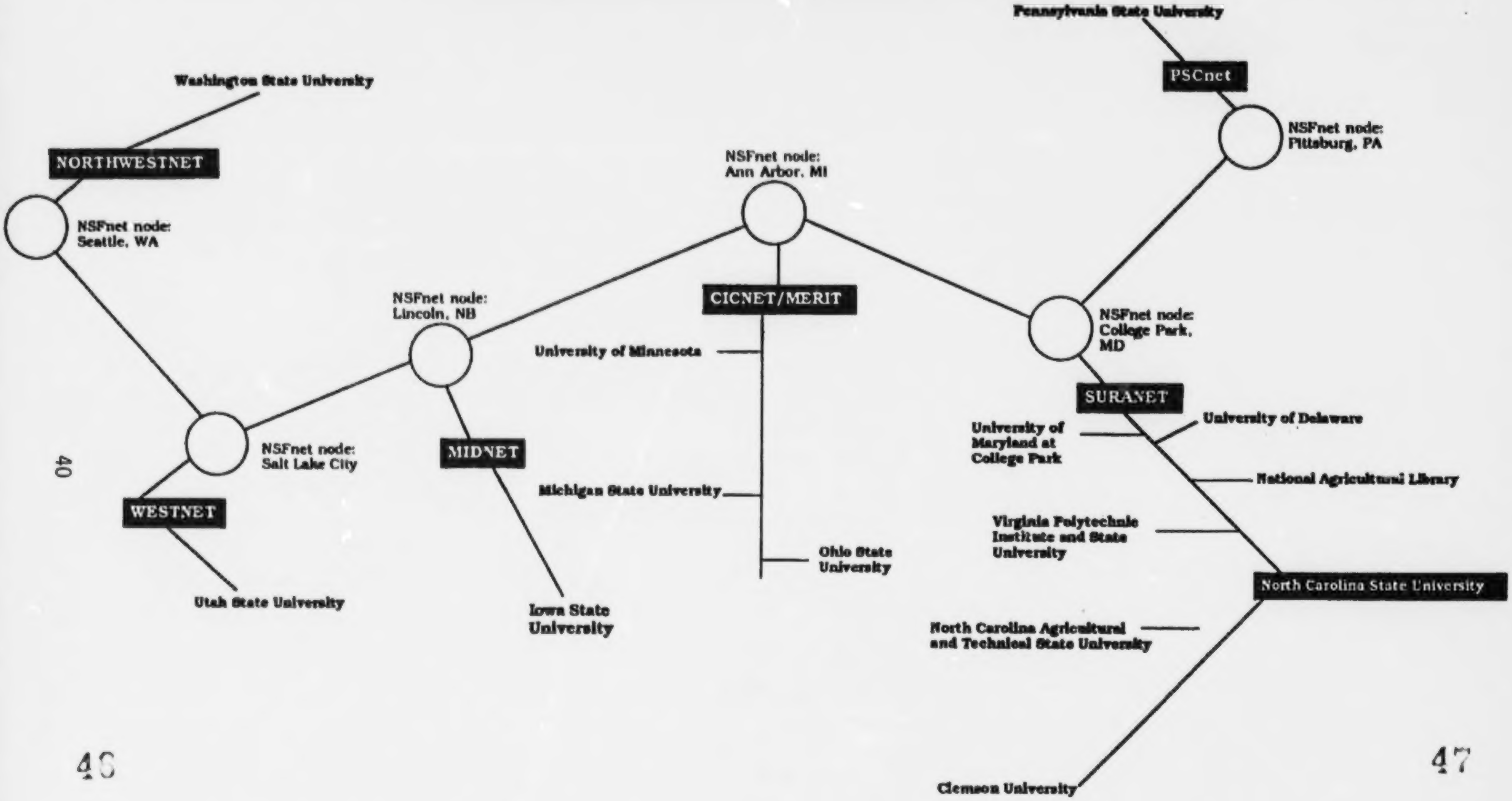
NCSU Digitized Document Transmission Project
Network Connections: Logical Schematic
June 1991


Pennsylvania State University
PSCnet
NSFnet node: Pittsburg, PA
Washington State University
NORTHWESTNET
NSFnet node: Seattle, WA
NSFnet node: Ann Arbor, MI
CICNET/MERIT
NSFnet node: Lincoln, NB
University of Minnesota
NSFnet node: College Park, MD
SURANET
University of Delaware
University of Maryland at College Park
NSFnet node: Salt Lake City
MIDNET
Michigan State University
National Agricultural Library
WESTNET
Virginia Polytechnic Institute and State University
Ohio State University
North Carolina State University
Utah State University
Iowa State University
North Carolina Agricultural and Technical State University
Clemson University

From Focus,
v. 12, no. 2

The Network Footpath from the Library:
The EDD Service

Faculty, staff, and students in the College of Forest Resources and the Department of Marine, Earth & Atmospheric Sciences have begun using an exciting new electronic delivery service being pilot-tested by the NCSU Libraries. Researchers can now receive journal articles and other library materials via the computers located in their offices, laboratories, and research facilities. The Electronic Document Delivery Service (EDDS) automates the entire process of requesting and receiving research materials retrieved from other libraries' collections. The Natural Resources Library staff will assist patrons who are not connected to the campus network by providing access through a project workstation located in the Natural Resources Library. The Burlington Textiles Library staff will introduce the service to the College of Textiles in the spring of 1992.

EDDS represents the second stage of a larger research initiative currently underway at the library, the NCSU Digitized Document Transmission Project (DDTP). The DDTP is investigating the feasibility of delivering library materials electronically between research libraries and across campus networks to the individual researcher. The fourteen land-grant libraries participating in the DDTP use commercially available computer equipment to scan or "digitize" requested research materials and transmit the digitized documents via the Internet to the requesting libraries. EDDS includes a mechanism that automatically notifies the researcher that the material has arrived, at which point the researcher accesses the campus network and retrieves the document. The digitized document is a replica of the original material and can include text and graphics.

The DDTP project has already established that print copies of digitized documents rival high-quality photocopies. The digitized documents can be readily transmitted across heterogeneous computer platforms and imported into standard text or graphics software packages.

EDDS consists of two components: electronic mail messaging and direct delivery or pickup of the digitized documents. The messaging system, modeled after the Reference Department's LibRef Service, allows researchers to place their article requests via e-mail to project staff in the Interlibrary Center. The direct delivery component allows the researcher to retrieve the digitized document(s) from a central campus fileserver via the campus network. The service delivers the requested material directly to the researcher in a machine-readable form. The service is not limited solely to the delivery of journal articles; any type of library information that can be captured in digital form or that already exists in digital form can be delivered over the Internet and across campus networks to the researcher.

Lisa Abbott, who recently joined the DDTP team, is overseeing EDDS while working closely with the library staff in the Interlibrary Center, Carolyn Argentati (head of the Natural Resources Library), and Sam Moore (NCSU Computing Center) to implement and refine the EDDS model. The pilot service has been made possible through an Apple Library of Tomorrow equipment grant. The DDTP is funded by a U.S. Department of Education Title II-D Research and Demonstration grant and by the participating institutions.

The twelve land-grant institutions participating with NCSU and the National Agricultural Library in the project are: Clemson University, University of Delaware, Iowa State University, University of Maryland at College Park, Michigan State University, University of Minnesota, North Carolina A & T State University, The Ohio State University, Pennsylvania State University, Utah State University, Virginia Polytechnic Institute and State University, and Washington State University.

Concept Paper
The Future Online System at TRLN

**An article describing the use of this position paper in the system procurement process at TRLN will appear in Advances in Library Automation and Networking, volume 5.

11/27/90

Concept Paper
The Future Online System at TRLN
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Concept Paper
The Future Online System at TRLN

Introduction

The bibliographic information system (BIS) developed by the Triangle Research Libraries Network (TRLN) has served as an adequate online catalog for the TRLN libraries for six years. Like all online catalogs of its generation, BIS falls short of the ideal library retrieval system. BIS's particular pattern of strengths and weaknesses results from limited resources for development and necessary trade-off decisions made in the course of design and implementation. In spite of a number of excellent features, BIS does not represent a promising platform for developing the fully functioning library information system of the future, primarily for the following reasons:

1. the high cost of local development
2. an expensive hardware platform
3. major gaps in retrieval and authority control functionality
4. software that is difficult to modify to incorporate the new features

For these reasons TRLN has decided to adopt a new strategy to the implementation of the next generations of its online systems.

Briefly, the new approach involves acquiring systems from commercial vendors. In doing so, TRLN will of course consider current functionality and performance of systems, but its primary goal will be to establish mutually beneficial relationships with innovative software firms that share TRLN's vision of future library systems. At the same time TRLN will seek to establish a similar relationship with a hardware supplier with a strong commitment to library applications and to the educational and library market. This document describes this strategy in more detail and delineates TRLN's general vision of future library systems. It is not intended to serve as a specifications document for the evaluation of candidate systems.

Assumptions

The underlying assumption at this time is that TRLN will not identify a system that will meet all of its requirements. We share the perception of numerous librarians that state-of-the-art systems offered by commercial firms still do not fully meet research library needs. Many difficult trade-off decisions will have to be made with respect to the current functionality of systems evaluated.

Not the least of these decisions will relate to the extent to which TRLN must sacrifice the strengths and special features of BIS not commonly found in commercial systems in order to gain expanded functionality in other areas. Examples of the special qualities of BIS include:

1. the distributed network design
2. a record validation system that is possibly the most advanced in the field
3. superior capabilities for normalizing index terms and search statements, and indexing special characters

4. refined capabilities for handling complex holding mixtures (different call numbers of multiple and the same location; accompanying materials, etc.)

It is acknowledged that the new strategy may result in the loss of some of the outstanding bibliographic qualities of BIS, at least in terms of current capabilities. However, these capabilities will be sacrificed only for the sake of larger strategic advantages that place TRLN in a more favorable position with respect to the transition to future generations of online information systems.

A prominent general assumption about future library systems is that interconnectivity and flexibility will be their most critical characteristics. Interconnectivity can be defined in several contexts; on each campus, the library system should be a major component, if not the integrating core, of a campus-wide information system; it should also serve as a gateway to external databases, including full text systems, as well as document delivery and information services of various types; and it must be easily interfaced with workstations to serve as the source of data for individualized electronic files and electronic document delivery systems. Flexibility implies, among other things, hospitality to records from many different sources, including OCLC, LC, GPO, indexing services, as well as locally created records. Through flexibility and interconnectivity, the system's primary data file will not only be more varied and expansive, but the system will allow users access to a variety of data sources beyond those representing the libraries' own collections. It is in this area that a new system should redress some of the major limitations of BIS. In the general assessment of candidate systems, the technical implications of this concern for interconnectivity and flexibility involve issues of standards, hardware compatibility, networking capabilities, etc., that may in some cases override issue of present performance in support of specific library functions.

A third assumption is that the local networking environment will continue to be a paramount consideration. The linked online catalog supports shared use of collections and programs of cooperative collection development that constitute the heart of TRLN collaboration. A principal criterion for judging candidate systems will be their potential for supporting these programs, either in terms of present networking capacity or negotiated agreements concerning future development. Support for networked architecture, however, does not require that TRLN mirror the existing configuration for operations, with computers and systems management staff at each TRLN site, but rather that the catalogs functionally and architecturally embody desirable network features, even if the implementation is on a single computer or several computers housed centrally. Of all current BIS functionality, the networking capability will be the one that must be preserved in some form in a new system.

A fourth assumption is that the future TRLN system need not be a fully integrated library system as traditionally conceived. Rather, the total system may consist of a series of interfaced components chosen on the basis of their performance in supporting specific functions (online catalog, acquisitions, serials control, etc.). Thus a major consideration in selecting systems may be their hardware compatibility and potential for interfacing with components already in place.

A fifth assumption is that successful acquisition and implementation of commercial systems will turn on the ability of the TRLN libraries to meet needs and build acceptance throughout the university communities. For this reason system acquisition, development, and implementation will be done in cooperation with the university computing communities, in particular with the university computing centers. The libraries will draw on the particular expertise of the campus computing communities in hardware performance, application performance and efficiency, distributed computing and connectivity, awareness of standards and standards compliance, and operating systems. It is important that the libraries keep the computing centers, along with other campus constituencies, fully informed on progress and developments during the search and evaluation process. While the libraries must build strong connections with campus computing centers, the relationships they establish should ensure that final judgements and decisions on systems acquisitions and development priorities rest with the TRLN libraries.

The final assumption is closely associated with networking and flexibility. It is assumed that the appropriate arrangement with a software vendor will include involvement of TRLN in the design of future systems and some degree of codevelopment. It is anticipated that joint development efforts will present the opportunity to apply TRLN's software engineering expertise in networking and processing support as well as shape a significant library system of the future. Collaborative arrangements assume that vendors will be "in for the long haul"; vendors with stable market and financial histories will become principal candidates to supply systems support. Purchased systems and the vendor relationships that come with them will fill two roles: as a production platform for support of routine library operations, and as a dynamic, flexible development and experiment platform open to improvements as required by the TRLN libraries' constituencies. It is further assumed that the principal areas for TRLN participation will be in embellishing and customizing the system's capability for interconnectivity and flexibility, or development "on the fringes" of the primary applications software system. This assumption is based on a principle that we believe may well be the ideal goal of future library systems and library/vendor relationships: the acquisition of a general systems capability designed so that the user interface and interconnectivity with other local systems is largely under user control. The goal will be a cost-effective combination of standardization and customization. The vendors' level of interest in working in this direction will be an important criterion in the selection process.

The weight of these assumptions has strong implications for the systems evaluation process. *Taken together, these assumptions imply that the decision of which system to acquire will be conceived as a strategic decision*, not one based on close item-by-item comparison of current systems capabilities. It will be a decision with respect to how and under what conditions the TRLN libraries will proceed in the future to provide successive iterations of online systems rather that a choice between specific configurations of functionality and performance as they are currently offered in the systems marketplace.

State of the Art and Future OPAC Functionality

The functionality of an OPAC is the extent to which the system meets programmatic requirements for a library's production environment. Commercial offerings judged most competitive for the research library market offer capabilities recognized as "state of the art" to meet those needs. "State of the art" in this sense means capabilities that have come to be regarded as essential features for research library systems. The TRLN libraries assume that TRLN cannot develop BIS in a cost-effective manner to provide such essential features commonly available in commercial systems.

Commercial products appropriate for research libraries provide "state-of-the-art" feature sets similar in scope, refinement, and capacity, but no commercial system provides a feature set that fully meets research library needs. Differences between these commercial offerings, while sometimes significant, do not change their relative ability to meet the programmatic requirements of the TRLN libraries. Because of their similarity, analysis of appropriate products will weight configurations of functionality and performance considerably less than previous reviews undertaken by TRLN. Factors that will assume a larger role include the vendor's accommodation for joint development, the degree to which a product's design and implementation permits changes to meet future system requirements, and the performance of "state-of-the-art" systems in life-cycle cost models.

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"State of the art" features and considerations

1. *Standards compliance:* Software and hardware comply with promulgated and de facto standards that are well established for library applications systems, and show evidence of compliance with emerging standards important to systems migration and peer-to-peer data communications. A partial and by no means exhaustive list of such standards includes:

   - NISO Z39.2-1985 MARC format
   - NISO Z39.58 Common Command Language (ISO/CCL standard)
   - Other NISO Z39 standards as applicable
   - SGML and other compound document standards
   - ANSI RS-232C for serial communications
   - TCP/IP support for remote network sessions
   - "Glass teletype" and VT-100 for asynchronous terminal interface control
   - ISO/OSI Open System Interconnect protocol suite
   - SMTP or X.400 for electronic mail services

   Compliance with network standards is particularly important in light of TRLN's commitment to collaborative collection development.

2. *Well supported hardware platform:* The hardware platforms required by products are well represented and supported by the TRLN university community. This means that the university communities have such significant investments in the selected platforms that the TRLN libraries will benefit from purchase and maintenance discounts, site licenses, special vendor arrangements, and communications infrastructure support. In addition, the hardware supplier will have a strong commitment to library applications and to the educational and library market.

3. *Financially secure, stable vendor:* The selected vendor is stable, with sufficient installed base, financial backing or assets, and demonstrated organization staying power.

4. *Uses modern software engineering techniques:* Vendors that use "state of the art" software engineering techniques to construct and maintain their products will be considered better prepared for support and development than vendors whose products represent or require older, less flexible, more expensive techniques. Few or no operational commercial products show thorough-going use of modern engineering techniques, but ongoing development of some products employs such techniques to varying degrees from vendor to vendor. Modern engineering techniques for large-scale software development and maintenance include:

   - Modular construction: Application system is organized as discrete modules well isolated from other system components. The application's interface to hardware isolates machine-dependent interactions to replaceable modules, and database architecture is as removed as possible (given optimization constraints) from hardware and operating system considerations.

- Prototyping: Applications development relies heavily on CASE and I-CASE tools in a structured environment that employs rapid prototyping techniques as much as possible when defining and implementing functional specifications and requirements.
- Quality control: Separate quality control systems independent of development systems that test and evaluate product functionality and reliability.

5. *Provide integrated access to information:* Integration of data has come to mean modal access to data organized and presented as logically coherent entities to users. For instance, users can see comprehensive bibliographic data on items in library collections while using the catalog section of an OPAC ("catalog mode"), comprehensive information on journal articles while using the external database section of the OPAC ("external database mode"), and comprehensive information on community activities while using the bulletin board section of the OPAC ("bulletin board mode"). The data for each section need not reside in a single database, on a single machine, or in a single product. In general commercial systems access the collections of different libraries on the same product by a modal switch to their databases; the integrated union view of different catalogs provided by BIS is not available commercially.

6. *Authority control:* Different products provide different degrees of control over catalog entry points. The strongest and most flexible control possible over all entry points is desirable. Good authority control will provide a suite of tools for maintaining consistency and integrity of catalog entry points, such as global change and replace for any entry point, automatic notification of consistency or integrity violations from incoming records or edits, and variant form dictionaries or thesauri to map non-standard to authoritative forms.

7. *Use of multiple class number schemes:* It is not uncommon for libraries to use more than one classification scheme for their collections, for instance Dewey and LC. Commercial systems support multiple classification schemes in different ways, some more desirable than others. The BIS approach of interfiling all call numbers is the least acceptable alternative.

8. *Multiple input sources for records:* Commercial products generally support three minimally required input streams for record creation: tape load from different vendors, where the software is equipped to deal with small idiosyncracies in vendor data formats; direct record transfer from OCLC, from either a screen image or a MARC record transmitted to the system; and local creation of full MARC records. TRLN will prefer systems having the greatest flexibility in handling different record formats. TRLN will examine systems particularly respecting their ability to load records from the broad variety of existing bibliographic managements system already in use by TRLN libraries (e.g., INNOVACQ, BIS, microfiche systems, etc.)

9. *Real-time editing of changes:* Commercial products reflect changes to existing records in two ways: immediately, by applying edits as they are made; or by holding changes in special files until stand-alone programs are run to make the changes in the production database. TRLN will prefer products that reflect changes to the production database as soon as possible after the changes are made.

10. *Comprehensive searching capabilities:* Basic indexing and searching features of commercial systems include author, title, publisher, subject headings, call number, and control number searches; keyword indexes for library-specified fields; and, in some systems, proximity string operators, phrase searching, author/title search, and other more sophisticated searching tools.

11. *User-tuned interface:* Existing products offer varying degrees of user control over the appearance and capabilities of the system interface. All products offer strong parameter-driven control over the text of most screen messages and help screens. A smaller number of products give libraries

control over screen layout and design. No commercial system permits changes to command parsers, screen or window sequencing, or searching algorithms beyond setting rudimentary system-wide parameters. TRLN will prefer products that provide the most local control over interfaces with the least intervention or action by the vendor.

12. *Advanced record validation and editing system:* The BIS software provides edit validation and management facilities that rank among the most advanced in the field. TRLN will prefer products that provide the largest subset of these facilities, particularly security measures and control over when an edited record is released for application to the database.

Future OPAC capabilities

The feature sets of current state-of-the-art library systems do not include crucial functionality that TRLN libraries can project as technically and financially reasonable, and likely to be required by their chief constituencies, by the mid to late 1990s. Furthermore, the scope and rate of change shown by information systems technologies in the past is unlikely to abate, so that capabilities unenvisioned now or deemed unrealistic will become standard requirements for future systems. Commercial products appropriate for research libraries will accommodate future OPAC capabilities and requirements by demonstrating systems architecture and development planning along the following lines.

1. *Extendable system architecture:* The product architecture permits or will permit integration of locally developed modules for specialized tasks, particularly modules for connectivity or local data capabilities. Appropriate products will show modular designs with well-documented global environment requirements and interface parameters values. TRLN will seek vendor relationships that share goals towards future functionality, using a product whose design allows local development and enhancement with local software engineering expertise.

2. *Interface flexibility:* The product architecture distinguishes interface from search engine sufficiently for local extensions or development of interfaces to the catalog. Ideally, the product will permit customized interface design beyond that offered by most existing products. The product will have development tools and training to manipulate the interface as required.

3. *Precise retrieval of data in terms of its relevance to a user-defined need:* The OPAC architecture is open to exploring or implementing new searching techniques other than Boolean sets for managing retrieval, such as transferable retrieval sets and relevance weighing and vector retrieval. These capabilities would be added to state-of-the-art query functions available in commercial systems for constructing retrieval sets based on title, author, keyword, etc.

4. *User-defined arrangements of retrieval sets:* An increasingly difficult problem with centralized library information systems is the size of retrieval sets: as the scope of library information systems expands, retrieval sets grow to intimidating proportions. The OPAC feature set provides or will provide flexible, user-defined ways to segment or subset large retrieval sets, for example viewing only those portions of a retrieval set available locally or only those items within specified publication date ranges.

5. *Classification access for subject browsing:* Current products provide for limited use of classification schedules for subject retrieval. Research points to improvements in retrieval through expanded use of classification searching, particularly for browsing collections. Classification searching will form the basis for a "virtual stacks" system. Virtual stacks will permit users to browse through shelf ranges, pick items from shelves and "open" them to scan the title and tables of contents, and move through the shelves from subject area to subject area regardless of the location of items in the "real" library.

6. *Flexibility in search engine and database content:* Library information systems will become a major component of university-wide information systems. To do so, the architecture of the system must provide a rich set of access and manipulation tools for enhanced bibliographic data, such as the full text of journal articles, tables of contents, and graphical images. In addition, the system architecture must provide for integrating different record structures and sources, for instance indexing records, electronic journals, electronic documents (compound documents), and other non-bibliographic databases.

7. *Integrated support for access by and to other computers:* The product architecture must provide for standards-compliant communications with other computers. The product should look to such capabilities as compound document transfer, subset transfer, transaction exchange (for interlibrary loan, automatic exchange of bibliographic records, circulation transactions, accounting data related to acquisitions, etc.), and machine-driven sessions with client desktop computers. The product should also look to support of gateway functions to data on other computers through standards-compliant techniques, for instance to locally developed databases on other computers, CD-ROM databases, and the like. Support for standard windowing techniques, particularly X, and low-end terminals (VT-100) is important. This functionality encompasses data transfer, but not data analysis; data is transferred to user computers for refinement and analysis.

8. *Modular construction:* The product architecture allows for sizing from small to large implementations in a modular fashion. Modular architecture also applies to adding other databases or other libraries in a multi-library system.

9. *Standardized, user-manipulated reporting tools:* Database design should be open to the use of general end-user database tools such as SQL and other report generators.

10. *Advanced tutorial and help subsystems:* Product architecture ideally supports locally-constructed subsystems that provide complete tutorial instruction on the use of the OPAC, with access from the subsystem to the OPAC for conducting tutorial searches, realistic retrievals, and the like. Tutorial subsystems provide complete instruction that would otherwise require a librarian. Librarians likewise control the content of succinct online help for reminders and guidelines in using software facilities.

TRLN recognizes that this description of current and future OPAC capabilities ignores important details and cannot serve as a reference guideline for evaluating system functionality. Nevertheless, it captures wide-spread professional consensus concerning the basic requirements for next-generation OPAC systems in research libraries. It should serve as the first-line assessment model to determine whether candidate systems should receive further evaluation.

Conclusion

This document offers a different perspective to systems acquisitions than that in general use by staff at TRLN institutions. Instead of evaluating details of functionality and performance, TRLN has decided to emphasize the strategic nature of systems acquisitions. Consequently TRLN has, for the moment, passed by specifying checklists of feature sets, guidelines for acquisitions, and other materials normally amassed prior to issuing an RFP. Instead, this document is intended to serve as the principal guideline for assessing commercial products with an eye to their strategic value and their suitability not only to bringing about TRLN's vision of future library systems, but to developing, in cooperation with hardware and software vendors, a new and expanded vision of library information systems and their role in academic information exchange. Products will be regarded more favorably as they provide greater flexibility for local development, openness to connectivity with other computing communities, and particularly as their vendors are open to establishing a mutually beneficial relationship for development and refinement of systems.

Policies and Plans for Cooperative Collection Development and Resource Sharing

A Joint Project of the Libraries of SUNY at Albany, Binghamton, Buffalo, and Stony Brook

Supported by the Council on Library Resources

StonyBrook

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MEMORANDUM

TO: Kate Herzog, CLR Grant Cooperative Collection Development Committee (Buffalo)

David Tyckoson, CLR Grant Resource Sharing and Document Delivery Committee (Albany)

Sharon Bonk, CLR Grant Needs Assessment Survey (Albany)

Tom Galvin, CLR Grant Research Director

FROM: John Brewster Smith, Director and Dean (Stony Brook)

SUBJECT: Progress Report for CLR Grant

DATE: July 29, 1992

At the July 13 meeting of the University Center Directors (CLR grant principal investigators) it was decided that a second progress report should be prepared for distribution to various interested parties including CLR officers and ARL directors. I have agreed to prepare the report on behalf of the principal investigators. The report will cover the period January 1, 1992 through August 31, 1992. I will also prepare a shorter version in press release format for use by the local campuses in any way they think appropriate. Both reports will be ready in early September.

What I need from each of you by August 15 is a brief but complete statement on the activities of your various grant projects, especially the studies and surveys. I will use this information as the basis for the report. Since the report period extends until August 31, I ask that you project your activities, if possible, to include that closing date. I also ask that you include a brief statement on "next steps" planned for your project(s), etc. A copy of Progress Report no. 1 is attached for your information.

Please feel free to call, write, fax or E-Mail if you have any questions. I thank you all in advance for your help.

CC: Meredith Butler
Eleanor Heishman
Barbara von Wahlde
Library Admin. Council (Stony Brook)

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POLICIES AND PLANS FOR COOPERATIVE COLLECTION DEVELOPMENT AND RESOURCE SHARING: A JOINT PROJECT OF THE LIBRARIES OF SUNY AT ALBANY, BINGHAMTON, BUFFALO AND STONY BROOK

Progress Report no. 1

December, 1991

The two-year project, supported by a grant from the Council on Library Resources, started in the spring of 1991 with the appointment of study committees on each of the four campuses. On October 3 and 4, key participants, including administrators, librarians and faculty, from the four campuses were brought together in Albany for a symposium on "Policy Issues in Cooperative Collection Development and Resource Sharing." Work now continues on the several studies and the development of plans and structures for the remainder of the project.

Background and Goals

Prior to the Council on Library Resources grant award, the SUNY University Center Libraries were engaged in a Title II-D, Office of Education, project which provided support for experimenting with faxing and digitizing materials between the Buffalo campus and the other Center Libraries. Two hundred mid-use journals were sequestered at each institution (these were backfiles only, not current issues), and the articles requested by students and faculty were faxed or digitized from the Buffalo Center. Much data has been collected on this project, and an analysis of the findings will be shared at the end of 1991 when it is completed. In 1990, the SUNY Centers (excluding Albany), committed to the establishment of technical linkages between their NOTIS catalogs. This venture is a design activity with NOTIS Systems Inc. and is developed with partners in the State of Indiana who are asking for similar linkages. The PACLink project, as this is called, is moving on schedule and will be tested early in the coming year between Binghamton and Stony Brook. Ultimately, the PACLink software will provide linked catalogs for searching and interlibrary loan requests and will permit the linking of non-NOTIS library systems.

Cooperation between the SUNY Centers is not new. What is new is the strong commitment to cooperation and the realization that this is a direction that must be taken to maximize the usefulness and availability of scarce resources. Cooperative efforts, in fact, are seen as key to the prosperity and even survival of SUNY research libraries in a new era of decreasing finances and increasing demands.

Very broadly, the goals of the project are to develop policies and plans for implementation of an active program of cooperative collection development and resource sharing among the four libraries. While the initial focus is on serials, it is recognized that additional aspects of cooperation will be a necessary concern. Other goals of the project are to involve academic and administrative structures in analysis and policy development and implementation planning. Library users must come to understand that their interests serve as a foundation for making policies and planning steps.

The Symposium

The October 3-4 symposium on Cooperative Collection Development and Resource Sharing was attended by 108 librarians, faculty, and administrators from the four University Centers and 10 invited guests from the SUNY Central Administration and Empire State College. The symposium provided an excellent opportunity for scholars, librarians and administrators to consider the implication for research libraries of changing patterns of scholarly communication and discuss major issues of technological change in the provision of information services. The underlying principle of the symposium is the belief that cooperation among research libraries improves the prospects for individual library success in fulfilling local needs. One outcome of the symposium was the creation of a group of librarian and faculty leaders on each campus who are informed about and committed to the success of cooperative projects.

Wayne A. Danielson, Dewitt C. Reddick Professor at the University of Texas at Austin, in his keynote address, presented the scholar's point of view on the "Implications of the Changing Scholarly Environment and the Conduct of Research." Peter Wagner, Provost and Vice President for Academic Affairs at SUNY Binghamton, spoke about "The Future of the Scholarly Journal." Duane Webster, Executive Director of the Association of Research Libraries, served as symposium facilitator and moderated the panel discussion on "Meeting Information Needs through Interinstitutional Cooperation." SUNY Chancellor D. Bruce Johnstone welcomed participants to the symposium and Council on Library Resources President, David Penniman, discussed the significance of the Council's policy grants program and the Council's future funding agenda.

Small group discussion sessions and a question and answer period at the end of a panel discussion on issues in interinstitutional cooperation, provided opportunities for participants to identify and discuss electronically shared access to research collections. Summaries of key points for all discussion groups were distributed to symposium participants and ideas and recommendations will be included in the action agendas for the project committees on each campus.

Those completing evaluation forms identified many issues they considered important to be pursued. The six issues mentioned most frequently were: continue to educate faculty about access issues (9); expand database availability and improve ILL services (8); work to change copyright laws (6); work with university presses and redevelop non-profit publication (5); build a national coalition of librarians and scholars to influence publishers (4); develop ways to share information more rapidly and more frequently (4).

Studies

Three project studies are currently under way: a journal overlap study, a study to gather data on the use of current and bound journals and a study to describe the use faculty and students are making of interlibrary loan for journal articles, and the actual and potential use of the four centers to supply them. The data from these studies will inform groups which will establish collection development and resource sharing policies aimed at increasing the effectiveness of system-wide cooperation.

Journal Overlap

A snapshot OCLC tape has been taken of the serial holdings of all four libraries. Preliminary analysis shows less duplication of titles than was expected. About 60 percent of the titles are held in common while 40 percent are unique.

Journal Use

The journal use study began in September, 1991, and will conclude during summer, 1992. "SCAN" labels have been affixed to the front covers of all current journal issues at each library. These labels as well as signs placed throughout the current journal stacks ask faculty and students to register their use of an issue until any given issue has been used 15 times. At the same time, the use of bound journals is being recorded by staff as volumes are reshelved in the stacks.

On conclusion of this study, data will be collected on the use of the bound and unbound holdings at each library. Analysis of these data will enable the libraries to identify patterns of use by discipline, to identify currently received duplicated titles which get low overall use at one or more sites, and to identify titles with extensive backruns which are duplicated at more than one site but which are seldom used. These data will help the libraries formulate cooperative purchasing and retention policies that will increase the effectiveness with which materials are acquired, the efficiency with which valuable library space is used, and the overall breadth of the resources available in the combined collections.

Interlibrary Loan

The focus of the "Resource Sharing and Document Delivery Study" is to determine the extent to which the four libraries currently use each other's journal resources through interlibrary loan as well as the potential for additional use. The study has been divided into two discrete parts. During the 1991/1992 academic year, the libraries will collect data on current interlibrary loan activity between the centers. No attempt will be made during this period to change existing behavior patterns. For the second part of the study, however, which will begin during fall semester, 1992, each library will consciously attempt to acquire requested materials from the others. Data will be collected on a sample of these transactions to compare results with regard to staff resources and other costs. This will allow the libraries to determine the viability of extended cooperation and assist with establishment of policies that will increase the attractiveness of such interaction among the campuses.

Next Steps

The studies previously described will continue on schedule and an additional study on user reactions and preferences will be designed by the project Research Director.

As it becomes available, data from the use studies of periodicals and data on use and patterns of interlibrary loan activity at the four libraries, as well as data from the overlap study, will inform policy discussions. Once a definitive set of policy issues has emerged, these issues will form the basis for action by the SUNY University Center Project Advisory Council. Recommendations for new directions in resource sharing and cooperative collection development for the four libraries should be forged over the course of the next eighteen to twenty-four months.

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POLICIES AND PLANS FOR COOPERATIVE COLLECTION DEVELOPMENT AND RESOURCE SHARING: A JOINT PROJECT OF THE LIBRARIES OF SUNY ALBANY, BINGHAMTON, BUFFALO AND STONY BROOK

Progress Report no. 2
September 1992

The project, supported by a grant from the Council on Library Resources, is in its second year and is proceeding on schedule. Data collection for the major studies is nearing completion and arrangements are being made for analysis and reporting of findings. The next steps are identification and discussion of policy issues by the SUNY University Center Policy Advisory Council.

Studies

Three major studies have been conducted over the past year to gather background data for the development of policy. These include a journal use study, an interlibrary loan use study, and a study of faculty need for access to electronic information resources.

Journal Use

Data collection for this study began on September 1, 1991 and ended in August 1992, at which time a year's accumulation of data on usage of both current unbound issues and bound backfile volumes was gathered. Reference, microform, government document and newspaper titles were not included in the study. Each SUNY Center Library was asked to use its local OPAC or serials management file and the previously prepared OCLC snapshot of journal holdings to develop a local database for the study.

Local Cooperative Collection Development committee chairs and systems staff met with project director Steve Roberts in New York City on Monday, April 13. They selected the elements to be included in the data collection sheets and the information to be included in the final reports. Buffalo will produce these reports for all four libraries. To avoid potential problems in file compatibility, it was agreed that all the files will be mounted at Buffalo and that they will be edited and data will be input using SAS.

Working versions of the Binghamton, Stony Brook and Buffalo files have been loaded on the IBM mainframe at Buffalo. File clean-up and data entry is taking place using the SAS Full-Screen Product which was purchased for this purpose. Buffalo's

Cooperative Collection Development committee members cleaned up the Buffalo file during June and early July and reduced it from over 30,000 to under 24,000 records. Clean-up of the Binghamton and Stony Brook files is taking place in September. Albany will do data entry locally using their Vax Datatrieve system and will provide use information via a tape-load later in the fall.

After data entry is completed, the following reports and analyses will be produced:

1. Current titles held by all four centers - an exact number of duplicated subscriptions, including profiles of usage for each duplicated title.
2. Rank order list of current titles held by more than one library - a list of duplicated titles ranked by use at each library from lowest to highest.
3. Call number analysis of journal usage at each library - a profile of holdings and of use patterns for different LC alpha classes.
4. Use analysis for each location (branch library, reference, etc.) at each library - a report for use by subject specialists and collection development librarians.
5. Use analysis of backfile held by more than one library - a listing of duplicated journal backfile and profiles of usage at each library.

These reports will serve as the basis for discussions and decisions on future cooperative collection development efforts such as coordinating new journal purchase decisions, coordinating journal cancellations, formulating collection development profiles to build expanded (rather than overlapping) journal collections, and developing weeding/storage guidelines for journal backfile.

Interlibrary Loan

The primary purpose of the interlibrary loan study is to examine and develop methods for increasing the utilization of the combined collections of the four SUNY libraries. To accomplish this, the libraries are conducting a study of the ability of their collections to fill actual patron-generated requests. The study is evaluating a sample of 4,000 requests for journal articles (1,000 from each library) to determine which titles are requested, how well the four libraries can supply these titles, which libraries actually are supplying them, and how long it takes to supply them. The sample was selected from requests submitted during the fall 1991 and spring 1992 semesters.

A preliminary examination has been made of all of Albany's requests and one-half each of the requests from Buffalo and Stony Brook. The data indicates that 47 percent of all requests can be supplied from the existing combined collections. At present, the libraries are using each other's collections to fulfill only 22 percent of requests. This indicates a potential for doubling reliance on SUNY university center combined resources.

The preliminary data also shows that it takes an average of 6 days to obtain materials from among the four libraries. This delivery time compares favorably to that from other sources. For example, it is identical to the delivery time from 3R's council member libraries (local area suppliers). Delivery time for materials from other SUNY campuses (non-university centers) averages 7 days and from other outside sources 8 days. While these preliminary data are subject to revision, it is expected that the relationships will hold when the final report is in.

The Resource Sharing and Document Delivery Committee will meet with interlibrary loan staff members from each campus in October, 1992. By that time all of the study data will have been compiled and analyzed. The Committee will then consider the future course of the study. At present, the intention is to begin a phase in which all requests are sent within the four libraries as a first choice. This phase will provide an indication of the effect on interlibrary loan departmental workloads of increased reliance on the combined collections. The RLG Ariel system is also being studied as a means of improving delivery time.

Need for Access to Electronic Information Resources

At the meeting of project principal investigators in November 1991, a task force was appointed to develop a survey instrument to assess faculty need and opinion regarding use of information available over campus and national networks. Current faculty use of material in electronic formats, and faculty expectations regarding library services in a networked environment also were to be investigated. The purpose of the survey was to gather information to facilitate planning of services on each campus as well as cooperative services for all four campuses.

The task force prepared a project rationale, sample instrument, project timetable and budget which the principal investigators accepted in April 1992. The instrument was refined and tested and will be distributed to all faculty on the four campuses in early September 1992. Faculty were requested to return the completed surveys to the campus library director by September 30. Data will be entered and analyzed during the fall semester and a report issued during the Spring of 1993.

Members of the task force are: Thomas Galvin, Professor, School of Information Science and Policy and CLR Grant Research Director; Judith Adams, Director, Lockwood Library, and Buffalo Project Manager; Sharon Bonk, Assistant Director for User Services and Albany Project Manager; and Joseph Cavanagh, Systems Officer, and Stony Brook Project Manager. Susan Faerman, Assistant Professor of Public Administration and Policy, Albany, is consultant on Survey design and data analysis. Deborah Andersen, doctoral student in Information Science, Albany, will join the group in September as a research assistant.

Next Steps

Completion of the studies, including analysis and reporting of findings, will continue during the fall semester. The first meeting of the SUNY University Center Libraries' Policy Advisory Council is also planned for fall. The Advisory Council will include librarians, faculty, administrators and students from each of the four University Centers. It will function as an advisory and discussion group to assist the university center libraries as they move toward closer collaboration and cooperation in collection development and resource sharing. The Council will use the information gathered by the CLR grant studies to identify policy issues that need most immediate attention. They will aslo examine choices and priorities necessary to enhance access to materials needed for teaching and research. The first meeting of the Council is scheduled for October 19th in Syracuse, NY and a second meeting is planned early in the spring semester 1993.

The project is expected to conclude on schedule during the spring semester 1993.

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The Workstation Campus

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April 6, 1990

The Workstation Campus

The Vanderbilt University Committee on Academic Computing and Networking presented a plan in February, 1990 for the advance of academic computing at Vanderbilt for the next five years. At the core of the plan is a vision of a powerful computer at each work site across the campus. This essay describes the investments necessary to fulfill the Committee's vision. This discussion begins with a technological forecast. It makes assumptions about technological choices. Actual investments will result from the decisions of thousands of individual students, faculty members, staff, and administrators, each assessing the opportunities and resources available in given settings. Generally, the strategy implies that the annual flow of resources to computing will increase by a factor of three above current levels by 1995, an increase that will take place gradually as the promise of the new technologies is fulfilled. The essay concludes with a prescription for the actions needed to move the University toward the goal of a workstation campus.

Computing resources will be of increasing significance for intellectual activity in all disciplines at Vanderbilt. The significant progress made to 1990 is prolog to the developments to come in the next decade. The benefits of gaining deeper insights, of making complex logical structures graphic, of managing large bodies of literature and other material electronically, of being able to communicate easily with colleagues around the world, and the ability for students and faculty to communicate in new ways, will be sufficient to warrant a significantly larger commitment to electronic tools. Gains in learning, of course, will result not simply from investments in hardware and software, but primarily from the personal investments of the time of faculty, students, and staff in learning to use the new tools in creative and effective ways.

The new environment has four components: i) the workstation, ii) the network, iii) campus information services, and iv) off-campus resources on the network. The Committee also prescribes investments to support faculty who plan new teaching strategies using the new tools. Costs have two important components: capital costs and support costs. The capital costs for the purchase of equipment, software, and information products are the central focus of this essay. Given the relatively short lives of electronic equipment, it will be best to describe these purchases as an annual rate of expenditure. Just as important as the equipment, however, are the support costs. Maintenance, training, and other support activities will require sophisticated staff. The essay attempts some estimate of these costs as well.

I. Workstation

Definition

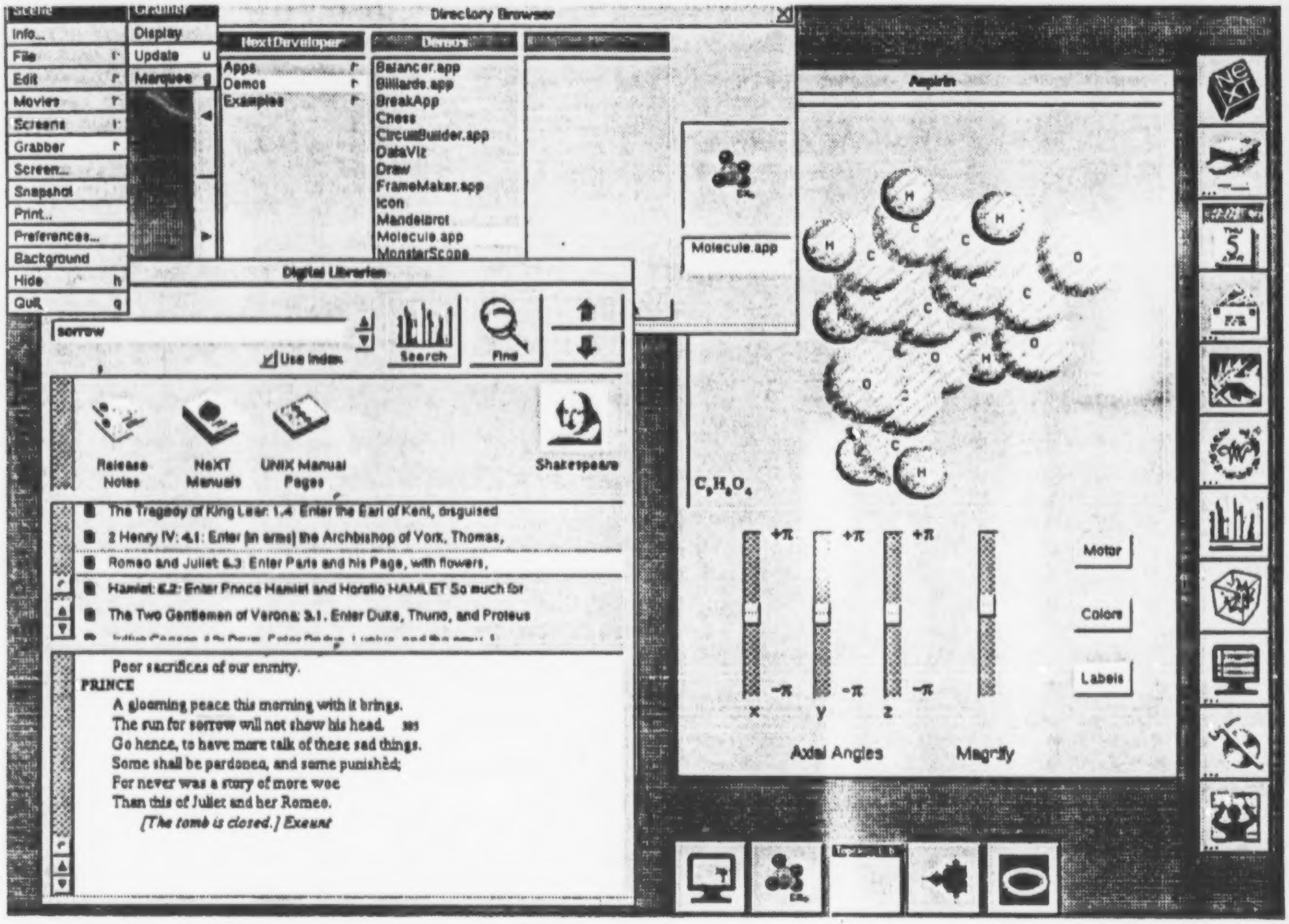
The standard tool for intellectual work will become a computer of a new kind called the workstation. This computer uses a graphic interface with multiple active windows. Each window can support a different computing process, all active simultaneously. One or two windows might contain text documents, perhaps one with a document under development, another containing notes or other source material. Another window might contain a spreadsheet with numbers and graphics. Yet another might contain a window to the library, with a book catalog, article index, or full-text with graphics material for active consultation. Another window might contain an electronic mailbox that allows exchanging documents with colleagues, students, or scholars around the world. Yet another window might contain an active session with a complex computation linked to a high speed processor somewhere on the network. Workstations soon will support video in a window as well. Figure One shows multiple windows on a workstation monitor.

The scholar can receive documents in the mail window, copy paragraphs to the writing window, search for sources in the library window, explore data in a spreadsheet window, and paste a graphic from the sheet into the written document. A draft document can be sent to colleagues at several remote universities and be acknowledged in a few minutes, even if the recipients are off-line at the moment. Notes for students can be posted in a private bulletin board for a class, with class members appending notes that will be shared among the members of the group. Students can create documents that are rich in text, graphics, data, and mathematical models. The instructor can interact not simply with the text, but also with the other materials to coach students more actively.

Workstation users generally use four or five applications routinely compared with the one or two applications used routinely by most users of the first generation of personal computing equipment.

Collaboration, data, mathematical models, and a broad array of source texts of many kinds will be used more widely, more effectively, and more easily by faculty and by students because of the power and ease of use of the workstation environment.

Figure One



- The Tragedy of King Lear: 1.4: Enter the Earl of Kent, disguised
- 2 Henry IV: 4.1: Enter [in arms] the Archbishop of York, Thomas,
- Romeo and Juliet: 5.3: Enter Paris and his Page, with flowers,
- Hamlet: 5.2: Enter Prince Hamlet and Horatio HAMLET So much for
- The Two Gentlemen of Verona: 3.1. Enter Duke, Thurio, and Proteus

Poor sacrifices of our enmity.
PRINCE
A glooming peace this morning with it brings.
The sun for sorrow will not show his head.
Go hence, to have more talk of these sad things.
Some shall be pardoned, and some punishèd;
For never was a story of more woe
Than this of Juliet and her Romeo.
[The tomb is closed.] Exeunt

Workstations can also support compound documents, that is, documents that contain not only text and graphics, but also sound, animation, and video materials. A diagram can contain a short animation sequence. A photograph can be a video sequence. An equation can be live, such that the reader can simplify it, change a parameter value, plot it, or use it in a subsequent calculation. The compound document can also contain pointers from one place in a text to other places and even to points in other documents. Instead of simple footnotes that give citations, the pointers of hypertext links can work as buttons that toggle up the full-text of the point of linkage. Any word can link directly to a dictionary or thesaurus reference complete with audio pronunciation. A reference to an individual can link to biographical information. Reference to a concept can link to a full-text source that describes the concept. A reference to an artist can link to examples of the art work, be it a color image of a painting, a video sequence showing a sculpture, or a musical score with audio tracks. Sophisticated compound documents are a feature of information products with commercial potential. Relatively few individuals will produce such documents in quantity, but such documents may be important materials for instruction in many disciplines. The visualization dimension of compound documents will become of increasing importance in scientific and engineering research.

The Advanced Classroom installed in A&S Psychology room 120 in August, 1989 has begun moving workstation applications into our curriculum. The facility, with a workstation for each student all connected via a high speed network, was used by eleven faculty members in six disciplines in its first year. The classroom is notable both for its workstations and for the sophisticated integration of audio and video services into the computing environment. The faculty have begun using applications software that takes advantage of the windows, graphics, and compound documents that require workstations. The software includes *Mathematica*, *Wingz*, *SuperCard*, *DataDesk*, and *SPPS* for the Macintosh. As workstations become more affordable and in wider use, more software will become available that takes advantage of the new class of machinery. The Advanced Classroom and the pioneering faculty who are using it are exploring a rapidly unfolding frontier in academic computing.

Specifications

To qualify as a workstation, a computer must contain sufficient memory to support a multi-tasking operating system with a high quality graphic interface and a processor of sufficient speed to handle the multiple processes. The monitor must be large enough and have sufficient resolution to handle multiple windows clearly. A local hard disk will generally be expected. For compound documents with audio and video, even with emerging compression techniques, a high capacity storage device (perhaps optical), seems essential. The workstation communicates via a network at ten megabits per second rates.

Given the pace of change in the computer industry and the productivity gains to be had from the powerful new generation of software that requires the powerful new workstation systems, we can expect all the microcomputers currently in use at Vanderbilt to be replaced in the next three to five years. As we move through a replacement cycle, we should expect many individuals to acquire workstation-class systems. The price with educational discounts of workstations today is under $5,000 (with monochrome monitor and excluding special hardware for audio and video and large hard disks). This was about the price of the IBM Personal Computer when it was introduced in 1982. This segment of the market is extremely competitive and the technology continues to evolve, and we expect continued decreases in prices of about 15 percent per year. As the prices of workstations decline, we expect most students and faculty to purchase them, spending somewhat more per system than similar individuals spent for microcomputers in the 1980's because the productivity gains of the workstation environment are substantially greater. Moreover, we expect the features of workstations to continue to evolve so that more powerful and sophisticated equipment will be affordable and valued in the 1990's as new applications . become available.

Table 1: Workstation Minimum Specifications, 1990

Attribute	Specification	Example
Processor speed	3+ million instructions per second (MIPS) often with high speed floating point computation (3 million floating point operations per second--MFLOPS)	Motorola 68030 or Intel 80386 or RISC
Memory	4+ megabytes of Random Access Memory (RAM) (8 megabytes is becoming a norm)	minimum memory on Sun SparcStation, Macintosh IIfx, and NeXT
Monitor	1000+ x 800+ pixels in a 15 inch or larger monitor (color is desirable)	15 inch E-machine monitor
Local Storage	100+ megabytes of disk storage (larger local disks are becoming a norm)	magnetic hard disk or Write Once Read Many (WORM) optical disk (possibly also a compact disk CD read only memory)
Communication	ten megabits per second	Ethernet

Cost

As individuals use computers for more tasks, we will expect computer-based activities to become important in a larger part of the curriculum. When more than half of the curriculum uses software applications aggressively, students are likely to want to own machines rather than share them. A typical student purchases a system at $3,000 for system and printer and $500 for software.[1] If 2,400 new students each year purchased systems, the total expenditure would be $7.2 million annually. Continuing students, say 5,000 of them, will likely purchase $300 of software each year in support of specific courses. That's a further expenditure of $1.5 million annually across the University. Such an outlay for equipment and software represents about three percent of the total cost of schooling including the opportunity cost of each student's time.

If system costs decline by 15 percent per year, systems that cost $5,000 in 1990 will cost under $2,500 in 1995.[2] Add $500 for software under the assumption that the more powerful workstation software will have prices comparable to today's microcomputer software.[3] Assume that students share printing facilities with a capital cost of $500 per student. (We might assume that with high quality networks students will share higher quality printing systems but at perhaps the same cost per student.) Assume that the workstation includes a suitable communications capability, for example, an Ethernet connection.

Each faculty and other professional staff member might spend $4,000 on systems including software and some shared printing resource. The higher figure for faculty makes allowance for the fact that some faculty will continue to want to press the frontier by acquiring early the latest and fastest machines at somewhat higher prices. If such systems last four years on average, we might expect to see 500 such systems purchased annually at $2 million. Another 500 small systems priced at $2,000 might be purchased for other staff at a cost of $1 million annually.

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[1] The average expenditure by students on computer systems at the Vanderbilt Computer Store, December 1989 to February, 1990, was $2,457 per system. The average student expenditure for a printer was $553. Four of five student purchases of systems also included printers.
For faculty, the average system price was $2,570 and average printer price was $564.

[2] The Hewlett Packard Apollo DN 2500 is priced at $3,500 in 1990 (reflecting an educational discount). It comes bundled with write, paint, and draw software and with *Mathematica*. Once the Motif interface is included and *Mathematica* with notebooks is available under Motif, then the Apollo system will meet the basic specifications above. The Macintosh IIx from Apple Computer is priced at $6,495 with 160 MB hard disk, 15-inch monochrome monitor, and 4 MB of RAM. Once the 7.0 release of the Macintosh operating system is available, the Macintosh IIx with monochrome portrait monitor will nearly meet the specifications when a $250 Ethernet board is included. The NeXT computer is priced at about $6,500 and it meets the specifications. The IBM PS/2 model 70/25 with 120 MB hard disk and 12-inch monochrome monitor at $7,195 plus a $250 Ethernet card will nearly meet the specifications once *Mathematica* with notebooks is available in the Microsoft Windows 3.0 (or in OS/2 with presentation manager).

[3] Assume word processing, spreadsheet, graphics, mathematics, and communications software as a basic core and allow several course-specific packages in the typical student's purchases.

Workstations likely will become standard tools in classrooms and be linked to projection systems to allow instructors to share text, graphics, mathematical models, and the like. Suppose one hundred twenty-five classrooms were equipped with workstations at $4,000 each, plus projectors at $5,000 each, plus security arrangements and installation of $3,000, with useful lives of three years. (Such public units should not be expected to last as long as personal machines.) The annual steady state expenditure will be $500,000.

Some number of workstations will be maintained in laboratory settings for student use. Some students may choose not to buy machines immediately on arrival. Different courses will require different machines (else the curriculum be limited to the least common denominator), and so students will need access to machines different than those they own. Students may turn to labs for support, for printing, for help in learning a new software application, and for group computing activities. The expense of the workstations for students is included in the aggregate student number. Additional expenses for space, for staffing, and special purpose equipment will be required in each lab. A lab might be staffed with student workers during the regular academic year for about $30,000 (making little provision for supervision and training). Allowing 40 square feet per machine would suggest annual space costs of $600 per machine including maintenance, furniture, and renovation costs. A lab of 30 machines would then cost about $50,000 annually including space mortgage but excluding the cost of the workstations themselves. If we maintained eight such labs across the campus (240 machines), the cost would be about $400,000 in addition to the cost of the workstations. (The workstations would cost about $200,000 annually as described above.) This represents approximately a twenty-five percent growth over current levels. There likely will be a place for investments in special computer labs every two or three years. For example, a lab equipped for interactive audio and video may be valued for foreign languages, education, medicine, and the sciences. There may be a place for a facility for three dimensional solid modeling in engineering.

We will continue to license software for each machine used on campus. We will take advantage of volume and educational discounts, of site license arrangements, and of opportunities to distribute software via the network with network licenses. As more specialized and sophisticated software becomes more important in more disciplines, software expenditures will increase relative to hardware expenditures. The Computer Store will play an important role in getting good prices on software.

The expenditure level for workstations and software at annual steady state flows of about $12.2 million will amount then to about three times present levels across the University in 1995. The bulk of the increase is the higher level of ownership of systems among students. Some is a commitment to a somewhat higher expenditure per system and some is a commitment to systems in labs and classrooms.

II. Network

Definition

The workstation requires a high speed network connection of at least ten megabits per second. The appetite of workstations for file storage can be prodigious. The powerful applications that are rich with graphics and formatting information consume more storage space. Audio and video documents are especially storage hungry, even when compressed. Moreover, as electronic files become the files of record, the integrity and capacity of storage systems become more important.

A high speed network allows resources on the network to function similarly to resources on local hard disks. For example, large-scale disk farms maintained by servers on the network can be treated much like additional hard disks on a local computer. Such shared network disk servers are convenient for storing large data files, for storing back-up and archival copies of files as insurance in the event of local hard disk failure, for storing files that are used by several people, and for storing documents in a store-and-forward mode for sending or receiving from others on the network. Thus, even as workstations include significant local disks and even optical storage systems with hundreds of megabytes of capacity, still the high speed network is of growing importance for personal file management. Moreover, there may be economies of scale in robotic, optical storage technologies such that the cost per gigabyte of storage is lower on larger systems than small ones. The scale economies seem to be exhausted at about one thousand billion bytes, that is, a terabyte of storage.

The high speed network also provides the same convenient access to library resources. The book catalog, indices to articles in periodical literature, a broad range of reference works including biographical dictionaries, thesauri, and encyclopedias will be readily available services on the network. Full-text with graphics files of extensive literatures will become available as well, supporting textual analysis in a variety of text oriented disciplines. Numerical databases relevant to engineering, science, and the social sciences will be available on the network as well. The 1990 *Census of Population and Housing*, for example, will be distributed primarily in electronic form. Moreover, people who use the *Census* will manipulate it in electronic form so that network distribution should be natural and well worthwhile. Network access means that students will have as ready access as faculty and so should be able to use statistics easily.

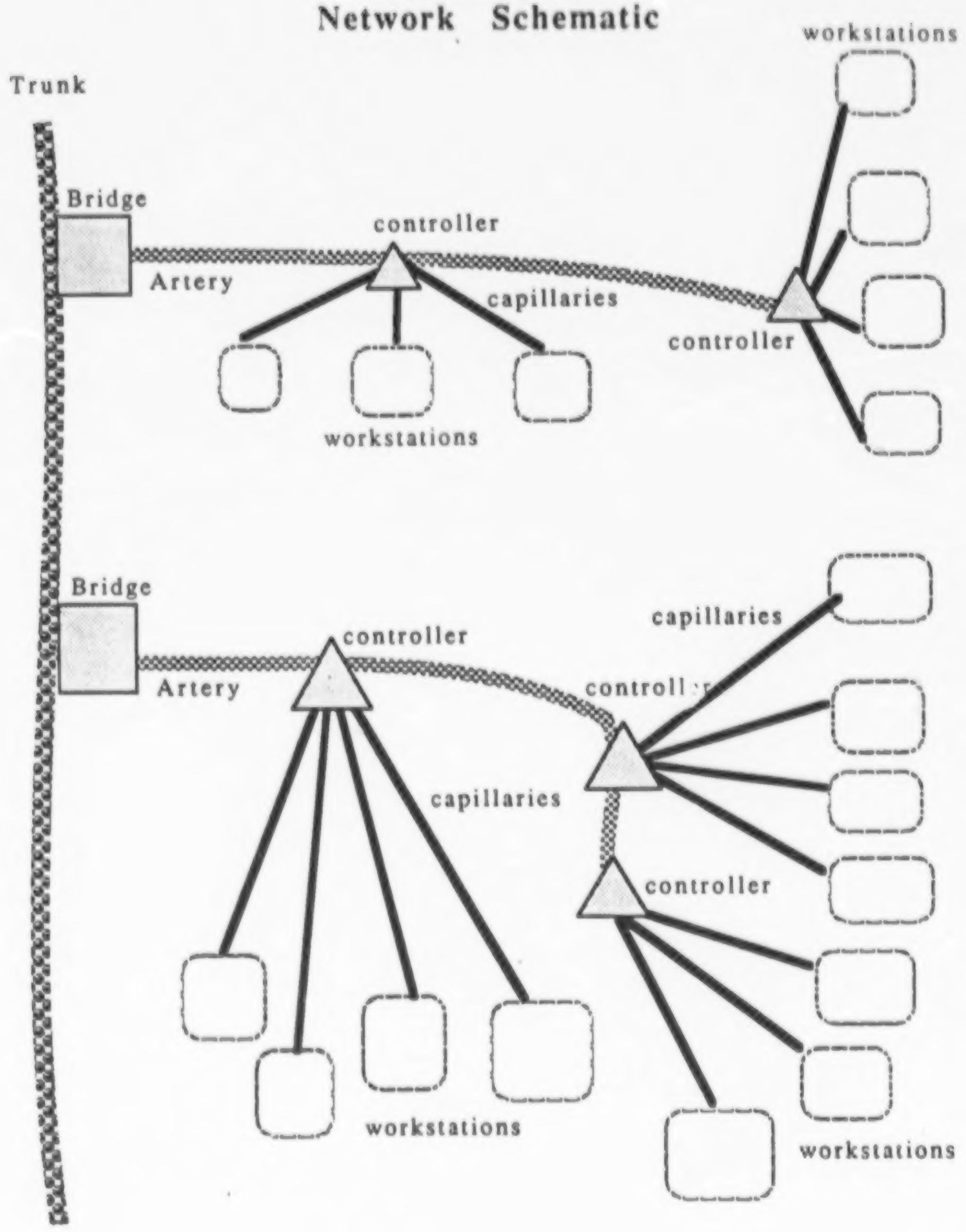
The network will support high speed computing services as well. With workstation software for mathematics, more students can find mathematical models within their grasp. Mathematics will then be a significantly more important component of our curriculum. However, few students will want to invest in the very high speed machines that process mathematics quickly enough to be used for course work. By linking their personal workstations to high speed servers via the network, they can develop mathematical models at low cost but depend on the shared server for rapid computation. The network allows more expensive, high speed processors to be shared among many users at lower cost per user.

The high speed network is a circulatory system for linking all parts of the academic enterprise for sharing documents, local printing resources, work-group files, campus-wide information resources, and various specialized computing resources. Figure Two shows a schematic of the relationship between the trunk, the local area networks, and the capillaries.

A ten megabits per second flow will move a document of 100 pages of text from point to point in about half a second. Here is a detailed translation of the rate of flow from pages to bits: One hundred pages might contain 25,000 words and so, 250,000 characters of information. Each character is one byte of information and is represented in eight binary bits of information. At ten megabits per second, such a file would move in a fifth of a second. Network capacities are, however, normally described in terms of the peak, burst speeds. The normal sustained throughput may be about 40 percent or so of the peak capacity. Thus, 100 pages representing two million bits of information will move in about half a second. A 500 x 500 pixel graphic image with 8 bits of color information at each pixel will move in about the same time. Fifteen seconds of video of 500 x 500 pixels with eight bits of color at 30 frames per second would involve 900 million bits. If compressed by a factor of 30, such a file could move over a ten megabits per second link in under ten seconds. For the compressed digital video to move over the network and be decompressed and shown in real time, a network of at least 30 megabits and more likely 100 megabits per second will be needed.

Higher capacities are required for arteries and trunks so that the traffic flow of many individuals can be accommodated simultaneously. Some systems, particularly those with graphics, audio, or video, will require higher speeds to the individual workstation.

Figure Two
Network Schematic



Trunk between buildings
Bridge to local area networks--arteries
Individual wires from controllers to each workstation

Table 2: Network Design Scheme

Level	Description	Example
Capillary	ten megabits or more per second flow from workstation to local net maximum length: 100 meters	Ethernet on twisted-pair wiring or on thin coaxial cable
Artery	ten megabits per second data among local workstations with bridge to trunk maximum length: one kilometer	Coaxial cable Ethernet with electronics within a building
Trunk	tens to hundreds of megabits per second dataflows linking many local area networks across campus maximum length: many miles	*present*: Caravan broadband cable with multiple channels *future*: fiber optic cable
External	*present*: 56,000 bits per second flow to the Internet *future*: 1.5 megabits per second speeds or more	SURANET connection to the NSFNet backbone and the future National Research and Education Network

The maps in Figures Three, Four and Five show the presently installed trunks for Caravan on the Vanderbilt campus, the links that constitute SURANet across the Southeast, and the connections of the NSFNet national system with links abroad. Table Three provides a forecast of the number of high speed data taps appropriate for existing buildings on campus based primarily on the existing number of telephone lines.

Specifications

In 1990, the best choice for delivering ten megabits per second speeds to individual workstations will frequently be Ethernet over twisted pair (that is,

Figure Three

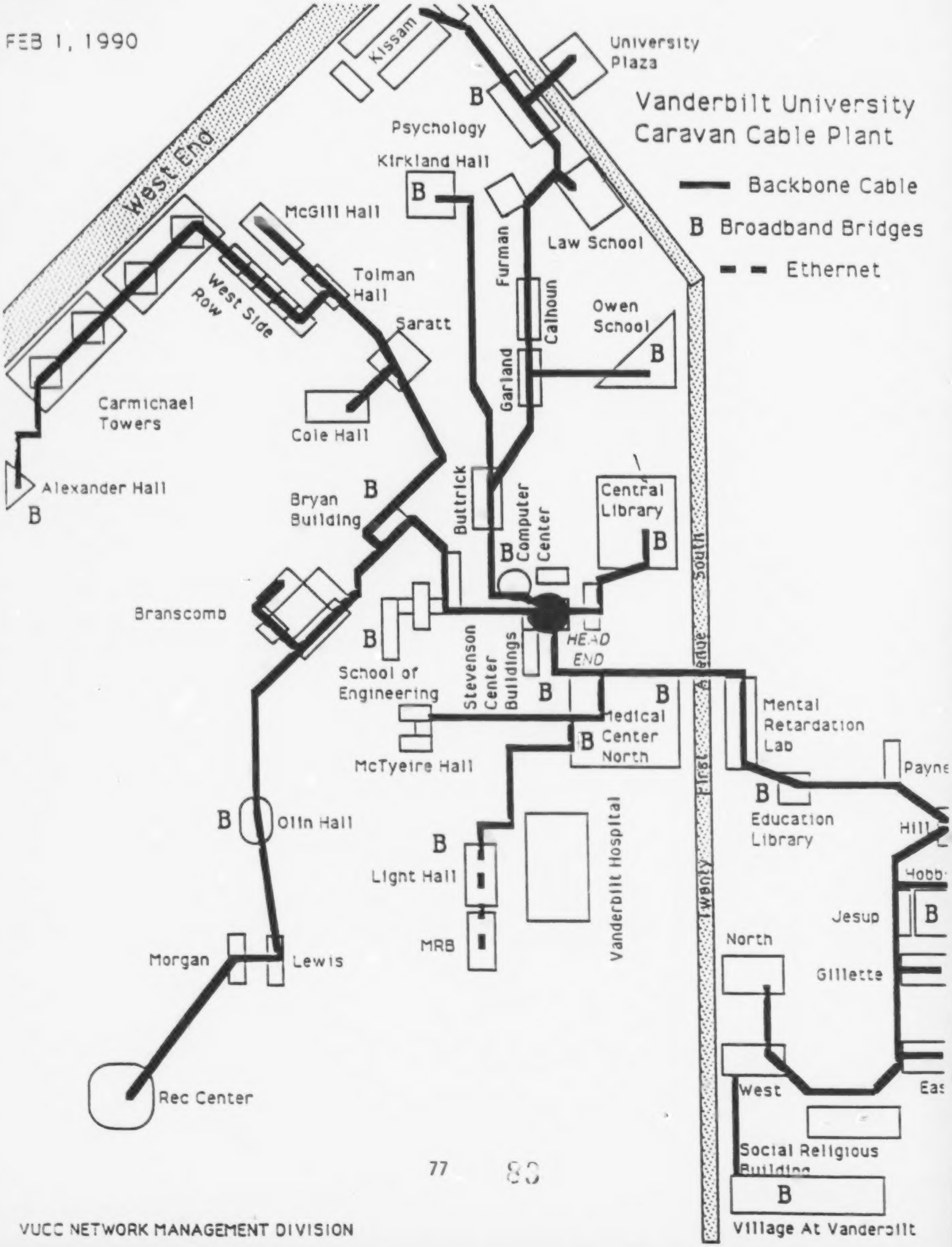
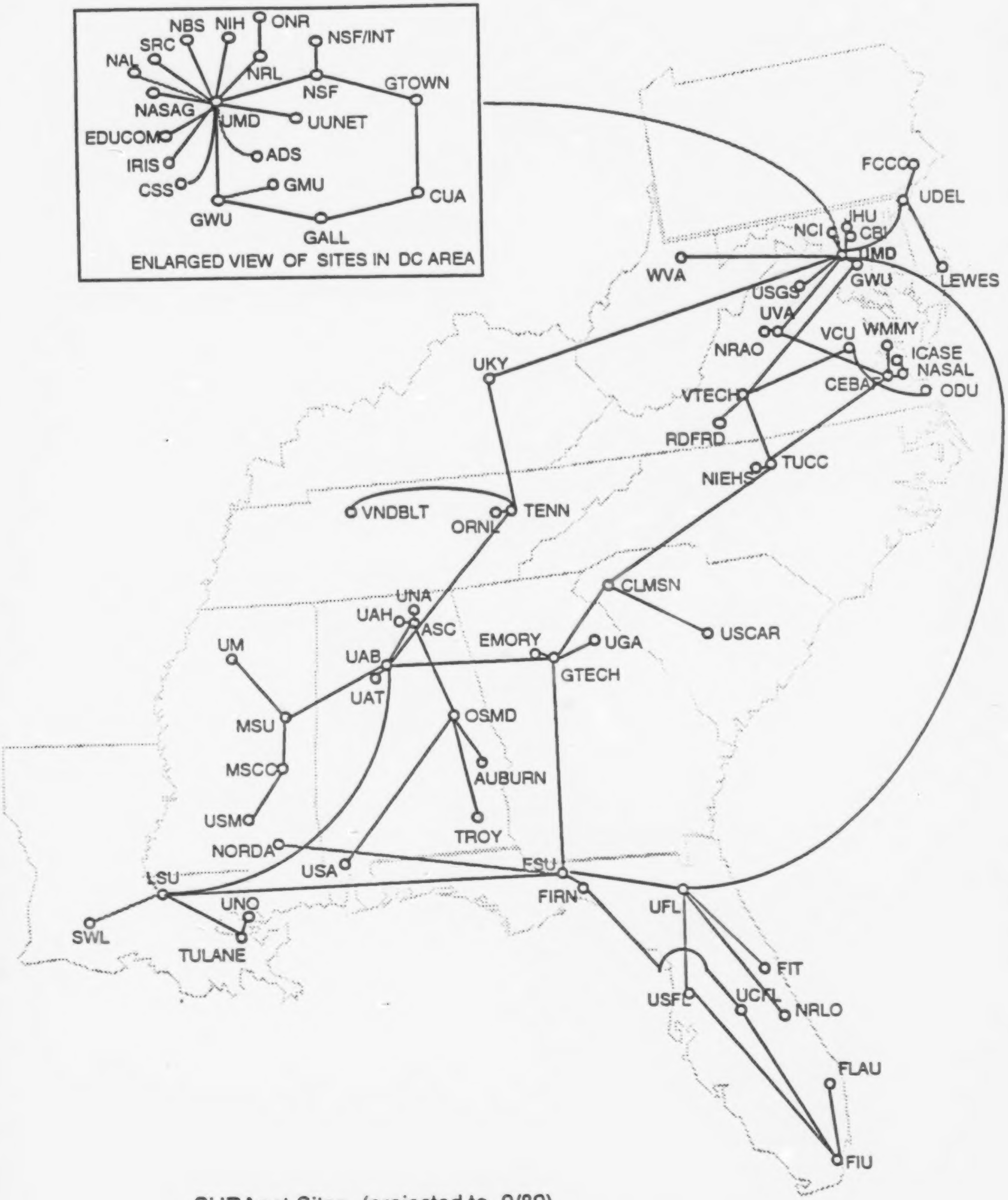
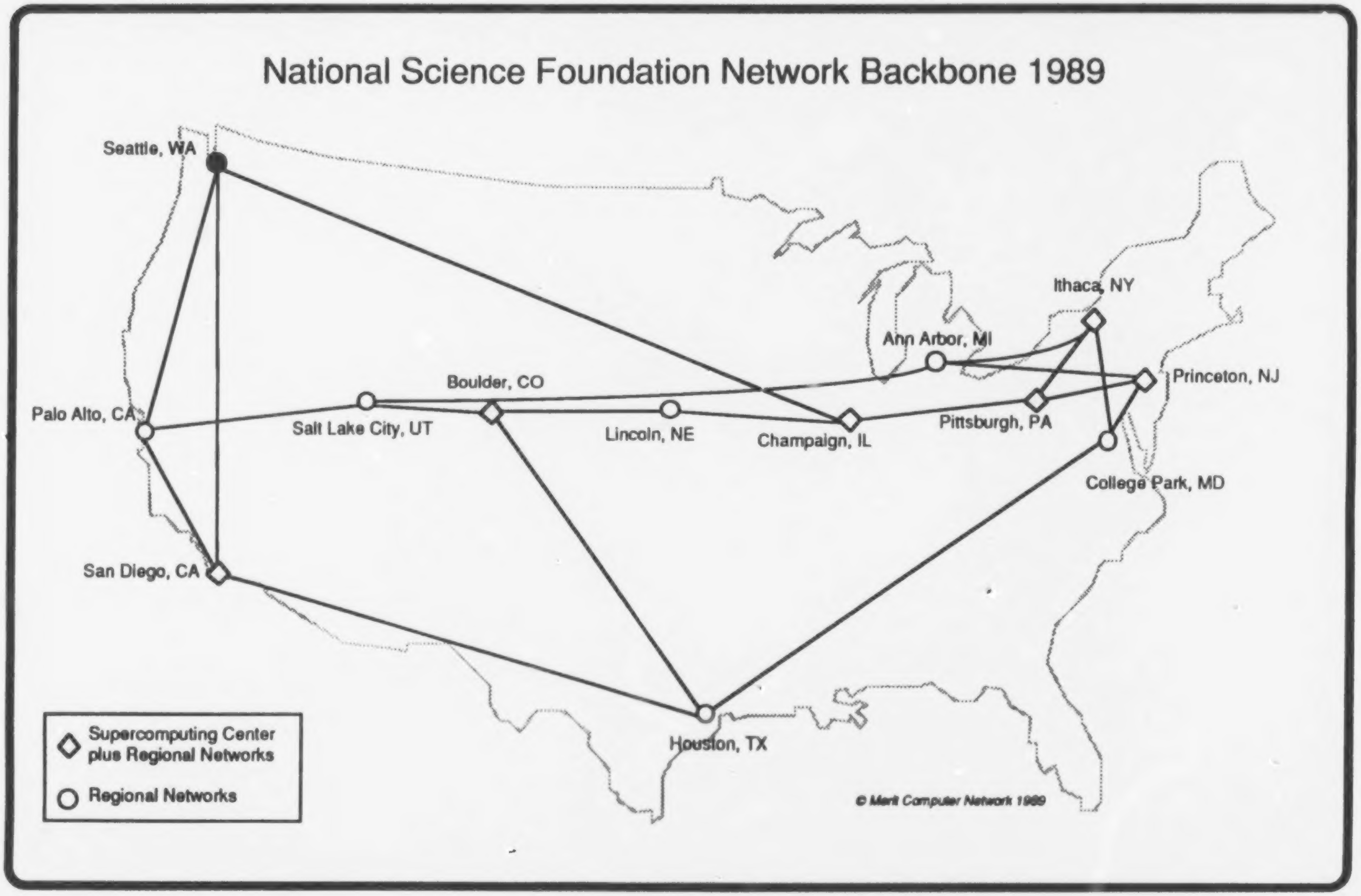


Figure Four



SURAnet Sites (projected to 9/89)

Figure Five



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telephone-like) wires.[4] Ethernet over twisted-pair wire or thin coaxial cable are alternative capillary systems. Such capillary flows will require still higher capacities in the arteries and trunks of the campus network.

The artery, the Local Area Network (LAN), generally uses a baseband coaxial cable. Think of a coaxial cable Ethernet running vertically through a building to closets on each floor as the local area network artery. On each floor, an individual twisted-pair cable runs from the wiring closet to each workstation on the floor.

In the basement, the local coaxial cable bridges to the Caravan campus trunk. The bridge is an intelligent device that filters trunk traffic so that local traffic stays local and does not burden the trunk system. Traffic moves somewhat more slowly over bridges than over trunks and arteries.

The whole configuration must conform to standard protocols so that disparate parts can link together in a manner that is transparent to users. The value of a common protocol is akin to the value of railroads adopting a common gauge for tracks. An important element of the standard protocols that govern data communication is the specification of the data packets that move from origin to destination. In particular, the packets must use common naming conventions for nodes on the network so that packets can be handed smoothly from one device to the next and still be recognized by the intended destination. In addition, the packets must have their constituent bits in a prescribed order so that the messages will be decipherable from end to end.

Because our campus is strongly committed to an open vendor computing environment, our campus network is committed to industry standard protocols that span many vendors and are most common in academic environments. In 1990, the TCP/IP protocol is the most common communication protocol in the academic and research world. The Caravan network environment supports TCP/IP fully. Because VAX computers have an important presence on our campus, Caravan also supports the DECNet protocol. Caravan supports low speed terminal communication via the LAT protocol. Apple Macintosh computers have an intermediate speed communication system called LocalTalk built-in. In several locations on campus, LocalTalk is bridged to local Ethernets. Thus, LocalTalk networks in different locations intercommunicate very well. On the CTRVAX, Pacer software unbundles LocalTalk packets from Ethernet packets and so the CTRVAX is accessible to LocalTalk users. There are LocalTalk cards for MS-DOS boxes, allowing DOS computers to communicate via LocalTalk.

We expect to migrate the Caravan protocols to the Open Systems Interconnect (OSI) protocol as it emerges as a vendor-supported, international standard. All the major computer vendors have announced their intention to support the OSI protocol once it is defined by international standard setting bodies. Until OSI is ubiquitous, some computing and networking equipment may be incompatible with presently supported Caravan protocols.

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[4] The Ethernet over twisted-pair wiring requires two pairs (four conductors) of unshielded wires. Vanderbilt's telephone cables to individual telephone outlets generally include three pairs of wire, the Northern Telecom standard. The AT&T standard cable has four pairs of wires. The maximum length for Ethernet over twisted pair wire is 100 meters.

Support for additional protocols can be quite expensive. Each new protocol requires conversion from every other existing protocol, thus the number of protocol converters grows at n-square minus n where n is the number of protocols to be supported. In addition, protocol conversion typically provides only the functions that are common to each protocol. The set of functions supported by the network is then limited to the least common denominator of the protocols supported. As more protocols are supported, the set of common functions gets smaller. Thus, although other local networks of other protocols exist on our campus, they can only be linked to the Caravan trunk at the very considerable expense of adding additional protocol conversion capability. Generally, we hope OSI will arrive soon enough to avoid extensive additional protocol conversion.

Vanderbilt will want to install high speed network taps at each work site across the University. The best first approximation to the number of work sites at present is the number of telephone lines. Although some telephone lines may be in areas where network services are not required, there may be other locations presently without telephones where network services may be valued. The accompanying table, "Summary: Buildings and Network Potential," reports a count of buildings and telephone lines by major category of activity. Taking account of classrooms and a few other locations where network services may be desired but where no telephone lines presently service, we estimate a total of 13,000 high speed network taps for the present configuration of buildings. This estimate is a first approximation and will be refined as individual units of the University consider installation issues. For example, Residential Affairs may wish to install a network tap for each bed in every dormitory rather than each room. If so, the total number of network taps in present buildings will likely approach 15,000.

Cost

The principal cost components of the network are (1) the electronics for the capillaries, (2) the wiring, (3) the arteries, and (4) the trunks.

In 1990, Ethernet over twisted-pair costs about $400 per workstation for the electronics to link to the local workstation.[5] The cost of installing the wiring will depend critically on the specific structures. As buildings have been built or renovated during the 1980's, we have generally installed suitable wiring. In some other older buildings, wiring can be added at modest cost, say, $150 per tap. However, in some buildings, for example, Carmichael Towers, installation of more conduit may be necessary at higher cost.

If we expect to install 13,000 local Ethernet ports at $400 each with a service life of five years, we would have an annual steady state expenditure of $1 million for electronics at 1990 prices. The 13,000 tap figure is based on an interpolation from the count of telephone lines presently in use. We assume somewhat more data taps than telephones in dormitories so that every student may work with a workstation connected. The local wiring should have a useful life of at least ten years. If we assume that $150 must be spent on wiring for each tap, we have a total expenditure of $1,950,000 that will be spent over time as the full network for the campus is completed. A five year program to install wiring to data taps at each work site will cost about $390,000 per year.

The arteries of the campus network are generally local area networks that span departments, a building, or even a cluster of buildings with local cable length under one kilometer. The cost elements of such an artery are the cable, some electronics, and a bridge to the trunk system. Such a system might cost as little as $9,000. If such an artery served 50 local taps, the cost per tap will be $180. At present, we have installed 16 such arteries bridged to Caravan. In steady state, we might reach 100 such facilities with 130 taps on each local artery on average with a service life of five years for the electronics. With a fully wired campus, we will have more taps per artery and will achieve some economies of scale. The per tap cost might fall to $100 implying an annual steady state expenditure for the capital costs of $260,000.

In 1990, the trunks of the Caravan system use broadband technology, that is, the technology of the cable television industry. This technology was the best choice in 1984 when we decided to use it and it has sufficient capacity for considerable growth above present flows. Moreover, it supports distribution of twenty channels of video at very low incremental cost. The video distribution service, TeleVU, generates a cashflow that supports a share of the operating and maintenance costs of the broadband trunks.

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[5] The $400 does not include communication gear at the workstation. In 1990, workstations like the Apollo and NeXT have Ethernet communication as a standard feature. However, the Ethernet provided is a link to coaxial cable Ethernet. A converter priced at $200 is needed to link to Ethernet over twisted pair. A standard for Ethernet over twisted pair wiring (10Base-T) is now being developed. We assume that well before 1995, workstations will include Ethernet over twisted pair as a basic communication feature.

Table 3

Summary: Buildings and Network Potential

Building Group	# of Buildings	# of Single Line telephones	# D-term telephones	# other	Network Tap Potential
Administrative	30	1014	455	25	1494
Academic	33	1841	302	130	2273
Medical Center	16	4378	1047	25	5450
Dormitories	33	3223	55	250	3528
Fraternities & Sororitie	24	78	0	0	78
Others	12	112	65	0	177
Total	148	10646	1924	430	13000

The number of telephones shown are those in use in March, 1990. The network potential may equal the number of telephones in use plus some additional ports in conference, classrooms, and labs. The number of network taps desired might exceed 13,000 by about 2,000 if a tap is installed for each bed in every dormitory instead of one for each room.

Some off campus buildings are excluded. Mayfield Place is counted as one.

The Caravan broadband cable reaches more than fifty buildings on campus and it is within short runs of most of the remaining buildings. A connection to VIPPS is logical in the near future. McGugin Center has a microcomputer facility that should be linked to the network. Caravan has gone to Lewis and Morgan, but not yet to Blair. The cable has gone to only one fraternity house. Running cable to buildings not now linked may cost a further $50,000 per year for five years, with $250,000 in all.

Table 4

Five-year Network Growth Plan

13,000 tap network

	1990-91	1991-92	1992-93	1993-94	1994-95
wiring	$390,000	$390,000	$390,000	$390,000	$390,000
electronics	$210,000	$380,000	$515,000	$625,000	$710,000
arteries	$390,000	$390,000	$390,000	$390,000	$390,000
trunks	$50,000	$50,000	$50,000	$50,000	$100,000
operations	$350,000	$450,000	$550,000	$660,000	$760,000
total	$1,390,000	$1,660,000	$1,895,000	$2,115,000	$2,350,000

The forecasts shown in Table 4 involve (a) a five-year plan to bring local wiring to 13,000 taps across the campus, (b) a significant growth in electronics to support communications on the local capillary wiring with price declines of 10 percent per year, (c) a five-year program to install arteries to support the local communications with links to the trunks, (d) a continuing investment in broadband installations to 1993 and then investments in fiber optic cables for the trunks. This five-year program compares with current capital and operating expenditures of under $500,000 per year. Expenditures in future years are likely to be sustained by an increased demand for the higher speeds of fiber.

Within the next five years, optical fiber technology likely will come to dominate the broadband technology currently in use. Caravan should begin to migrate to fiber as the traffic flows on the broadband reach the limits of its capacity, as the cost of electronic equipment for using fiber falls, and as the capacities of fiber systems increase.

Fiber optics has several inherent advantages over broadband. Fiber does not depend on the fragile amplifiers used in broadband and so is less expensive to maintain. Fiber is not subject to electro-magnetic interference and so is inherently less error prone. Fiber technologies are rapidly evolving. The rate of flow on fiber will continue to increase over the next decade and beyond as the electronics improve. Flows in excess of one billion bits per second (one gigabit per second) will be achievable soon. Thus, future demands for higher traffic flows will be accommodated by replacing the electronic components with new vintage components to pump data packets through the same fiber at higher speeds. Fiber has the disadvantage of not being able to distribute analog video signals to ordinary televisions at low cost.

Sometime in the mid-1990's, Vanderbilt will want to upgrade Caravan trunks from broadband to fiber optic cable links. This will involve replacing the bridges from local area networks with fiber bridges and installing the fiber optic cables. We hope the conversion to fiber can be gradual, introducing fiber where data traffic is highest. We should begin immediately to include fiber cables in trunk and artery installations so as to prepare for the time when fiber will be the standard trunk and arterial facility.

The trade press reports advocates of fiber links all the way to the desk top and we should expect to see a demand for the very high capacities of fiber links to some labs and high speed computer facilities in the intermediate run. However, the cost of the electronics to pump data through fiber links looks as if it will remain too expensive to justify fiber links to most desk tops within the next five years.[6]

The network will also involve maintenance and operating expenses. Although there are likely to be some economies of scale, the cost likely will run about half to three-fourths of the annual steady state capital expense.

III. Campus Information Services

Definition

Workstation users will benefit significantly from a rich set of information products and services delivered to them via the network. These services will include library-like services: reference tools, full-text files, numerical and image files, and algorithmic information. In addition, users will benefit from network storage devices and high speed, specialized computation services to complement the resources of their personal workstations.

Specifications and Costs

The Heard Library already supports a full catalog of its holdings and indices to the articles in over 4,000 current periodicals on-line on the network. Figure 6 reports the level of search activity on Acorn in 1989-90.

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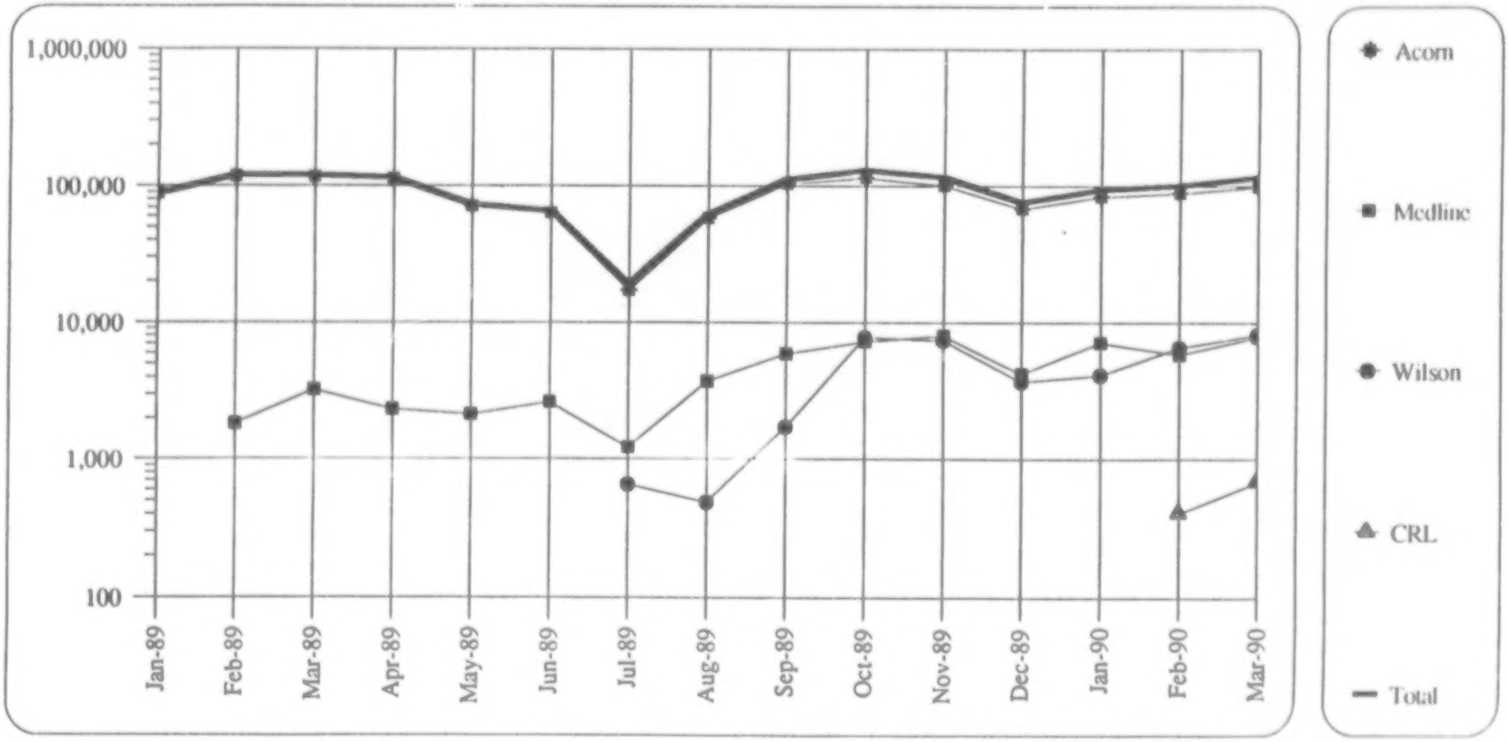
[6] We know of only one academic institution, Case Western Reserve, that is in the process of installing fiber taps ubiquitously. MIT and Princeton are launching programs to bring Ethernet taps to all their dormitory rooms within the next two years. They are using Ethernet on twisted-pair.

Figure Six

	Jan-89	Feb-89	Mar-89	Apr-89	May-89	Jun-89	Jul-89	Aug-89	Sep-89	Oct-89	Nov-89	Dec-89	Jan-90	Feb-90	Mar-90	Total
Acorn	88,357	117,636	116,492	113,378	71,033	63,029	17,098	57,664	104,085	115,678	101,327	67,939	83,752	88,769	99,270	1,305,507
Medline		1,831	3,234	2,335	2,140	2,635	1,225	3,726	5,939	7,254	8,071	4,227	7,095	5,868	7,871	63,451
Wilson							656	488	1,731	7,767	7,400	3,704	4,128	6,613	8,206	40,693
CRL														406	682	1,088
Total	88,357	119,467	119,726	115,713	73,173	65,664	18,979	61,878	111,755	130,699	116,798	75,870	94,975	101,656	116,029	1,410,739

Database Searching on Acorn Plus
January 1989 - March 1990



Medline introduced January 25, 1989
Wilson introduced July 23, 1989
CRL introduced February 9, 1990

Acorn use now exceeds one million searches per year. In addition, it supports article indices and several full-text sources on compact disks, a rapidly growing medium of publication. Within the next few years, the library expects to continue to expand its mainframe service and to bring compact disks to the campus network. The library expects to support full-text files with graphics and to implement on-line systems for managing quantities of compound documents.

We expect a natural evolution of electronic information resources. We have begun with information products where the value of searching large databases electronically is very high. As the costs of electronic systems continue to decline and as more users expect more information in electronic form, the library expects to add support for more documents in electronic format.

The economies of scale in electronic storage systems are exhausted at the terabyte scale. Jukebox systems that manage quantities of Write Once Read Many (WORM) optical disks at prices of about $600,000 hold up to 1.3 terabytes of data. Large scale magnetic storage systems are also evolving rapidly. Within two years, we may want to invest in an entry level WORM or other high capacity storage device to support information products at a cost of perhaps $150,000 for the storage device and perhaps an equal amount for information licenses. It is ambitious, but plausible, to expect a terabyte of storage capacity on-line within five years with a capital outlay of $1 million for a file storage server and associated search engine. Associated information license fees are speculative at this time.

We expect to support databases published on compact disks on the Caravan network in a manner that is integrated with our other information services. At present, compact disks are peripherals to microcomputers with operating systems that support only one search session at a time. Moreover, the retrieval speeds of the disk drives are slow. The present microcomputer systems use proprietary search engines and unique data formats that frustrate integration into a broader campus network environment. The microcomputer compact disk systems do not easily accommodate the accounting and security systems required in a campus network environment. For these reasons we expect systems such as Acorn that are designed to support many users simultaneously to present many databases in a linked and integrated fashion. Compact disk systems will continue to be effective for lesser used databases and we will seek ways to achieve an appropriate degree of integration with Caravan.

We expect Acorn and the other information systems on campus to support workstations. The search engines should share protocols with the workstations that readily pass search commands and search results. Workstations and high speed networks can send and receive information in sizeable chunks with final processing on the workstation. Instead of terminal sessions, we expect the information systems to pass bibliographies, working papers, and full encyclopedia entries with sound and graphics.

We expect workstations to be marketed with in-board compact disk or other capacious, optical drives by several vendors within two years because the larger storage devices are essential for managing compound documents. Indeed, Radio Shack began marketing a microcomputer with an on-board compact disk in the spring, 1990. When compact disks are standard equipment on affordable computer systems, publishers will find ready markets for compact disks containing professional libraries. A compact disk can hold 500 megabytes of data, the contents of, say, 250 books. We expect to see compact disks marketed to surgeons and tax attorneys, civil engineers and chemists, financial analysts and advertising managers, indeed, to most professionals. Our faculty will likely purchase compacts disks for their own specialties, but the library will want to find a way to provide access to many such disks via Caravan for use by students and by faculty in tangential disciplines. As the optical disk becomes a more important publishing vehicle, the library must find economical and effective ways to support it in our campus community.

The network will also support specialized, high speed processing systems. The speed of processors in computers continues to advance rapidly. Computers with parallel architectures can bring several and in some cases large numbers of processors to bear simultaneously on a single problem. On those occasions when a scholar wants to manipulate a model of some size, the personal workstation may be unacceptably slow. Convenient access to a shared server offering very high speed, large scale computation should be cost effective. Therefore, we might expect to invest in such a machine sometime within the next five years at a capital outlay of, say, $600,000, with annual operating budget of $150,000 to include support staff of an appropriate level of sophistication. At the present time, our large scale computing community continues to invest in local workstations, makes effective use of remote supercomputer time, and in some instances has purchased departmental machines. A physics group is co-owner of a massively parallel machine to be installed at Oak Ridge National Labs.[7] We might want to invest in very high speed systems to support computationally intensive research and instruction requirements every three to five years. The community of users is not large, but spans the College, the School of Engineering, Owen, and the Medical Center.

Table 5: Information Resources

Type	System
Content	Database licenses
Storage Facilities	Mix of Magnetic and Optical
Compute Servers	High speed and parallel systems

Although the Committee's vision was restricted to academic computing, in contemplating a ubiquitous, high speed, multipurpose network with workstations as the normal way of doing business, we should consider as well those administrative applications that serve a wide audience. The Computer Aided Drop Add (CADA) system is used by thousands of students interactively to modify class schedules. A full on-line registration system is in use on a number of other campuses and might be considered at Vanderbilt. Everyone has access to the University's calendar and schedule of events. We should expect faculty advisers and students to have appropriately secure access to transcripts on a read-only basis. The FOCUS accounting system promises to provide access in near real time to accounts by individual departments and principal investigators. Some universities have on-line transaction processing based purchasing systems. It is plausible to expect placement offices, recreation facilities, and other campus agencies to offer on-line announcements and scheduling of interviews and facilities. In short, many campus agencies have developed, are developing, or are likely to develop information services that take advantage of the ubiquity of high speed network communications and workstations.

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[7] Professor Volker Oberacker reports that Vanderbilt is participating with the University of Tennessee at Knoxville and Oak Ridge National Laboratory in the purchase of an Intel computer with massively parallel architecture for use in research in theoretical physics.

IV. Off-Campus Information Resources

Definition

The campus Caravan network system links to the national network. At present, data traffic flows at 56,000 bits per second via SURANET to the NSFNet and on to a series of other networks around the world called the Internet. In a recent week, traffic is moving over Vanderbilt's link to SURANET at a flow fo about 12 megabits per hour. We are planning to upgrade our link to the National Network to one million bits per second. The National Science Foundation has supported the development of the national backbone system and the operators of NSFNet have shown 45 million bit per second dataflows on an active leg of the backbone. Sen. Albert Gore and President Bush's Science Advisor, D. Allen Bromley, are advocating the emergence of the National Research and Education Network to provide a follow-on to the present academic network with a technical goal of moving data streams at three billion bits per second by the mid-1990's. The Internet uses the TCP/IP protocol and will migrate to the OSI protocol when it becomes established.

Vanderbilt's link to the National Network serves several functions. First, it links at least two thousand campuses from Singapore to Tel Aviv. Message traffic and files can be transferred in a store-and-forward mode at low incremental cost from any campus to any other on the network in a matter of hours and usually in a matter of minutes. As more campuses upgrade to higher speed connections, the national network will support more functions including remote sessions on computers. Vanderbilt's present connection is sufficient to allow effective terminal sessions on remote systems. Higher speeds will allow more simultaneous sessions and more convenient transfers of larger files.

Second, the network allows convenient access to remote supercomputers. The NSF Supercomputer centers are used by some of our faculty. Other faculty use computing resources at various national labs. As the supercomputer comes on stream at Oak Ridge, Vanderbilt's link to the National Network will be the data path our faculty will use to connect to it.

Third, the network will provide links to information resources on other campuses. The Welch Medical Center Library at The Johns Hopkins University, for example, is aggressively developing significant on-line databases. The first is On-Line Mendelian Inheritance in Man (OMIM), a database growing from Victor McKusick's textbook. The second is a database on the Human Genome. In each case, new lab results from around the world are submitted via the network for review by Professor McKusick in the OMIM and by a series of fifty committees chaired by distinguished scholars around the world (one committee for each gene plus a couple) in the case of the Human Genome database. Once a new finding is validated by review, it is so marked in the database. The database is accessible from around the world via the network. In this way, the community of scientists who work in this field have instantaneous access to the latest and best information available, can contribute actively and be assured of an effective and timely review mechanism. We expect similar specialized databases to develop on many campuses, including our own, over the next few years. The National Research and Education Network will be the way in which these resources are developed and used.

Fourth, other information providers will make products available on the network. Non-profit organizations like OCLC and RLG already have large databases of value to scholars. For example, OCLC's new EPIC service provides access to a database of 21 million bibliographic titles representing 350 million volumes in over 10,000 libraries with a high quality interface designed for use by students and faculty. OCLC is adding the catalogs of major libraries from around the world on a cooperative basis, including the Vatican Library, the Diet Library in Japan, the National Library in Taiwan, a group of academic libraries in France, and libraries in a dozen other countries. OCLC has also announced that they will be working with the American Association for the Advancement of Science to bring an electronic journal similar to *Science* to the network. RLG has developed significant databases in art, medieval studies, and other disciplines. Government agencies concerned with space, climate, the environment, labor, and commerce will likely make significant databases available to interested scholars via the Internet.

Commercial information vendors will offer services as well. Dialog currently offers hundreds of databases via the public packet switched networks. *Lexis* and *WestLaw* are significant legal databases offered commercially that could be distributed via the national network. Bulletin boards and archives of working papers in individual disciplines and for particular professions could develop and be significant for certain scholarly pursuits.

Fifth, the external network will link to a state level network we might call TennesseeNet with interconnections among the institutions of higher education, federal and industrial labs, hospitals, and state government. Such a network might serve the school systems of the state with access to instructional materials and programs, and electronic library resources. Just how such a facility should be organized and financed remains unclear, but several other states, especially Ohio, have moved aggressively to develop state level, multipurpose networks.

Specifications

The off-campus link will depend on the nature of the national network, how it is priced, and the level of connection we find appropriate. We should expect to make continuing investments in our connection to the national network so that the capacity of our link bears a relationship to the volume of traffic. High speed links will require larger investments in the equipment needed on our campus to make the connection as well as larger fees to entities who operate the network to sustain it. We should expect improved accounting and billing functions as the network evolves from a voluntary, consortial operating environment to a large scale, corporate enterprise. We should expect continued federal support for development of new network technologies, protocols, and innovative, academically oriented services.

Cost

The annual cost to the University will be of two kinds. First will be the cost of the telecommunication service. Second will be the cost of the information services used via the network.

The cost of our campus connection to the National Network will likely grow to the vicinity of $150,000 per year, a tripling of present expenditures.

The information services available on the network will involve a variety of price structures. Some vendors will expect and support individual billing to end users. Others will expect campus licenses. Still others may carry no price, but depend on the goodwill, reciprocity, and tradition of sharing among similar academic institutions. We do not venture a guess at the balance that will emerge between resources we choose to maintain on our own campus, resources we choose to license for the campus, and resources that we expect individuals to pay for as they use them.

V. Academic Initiatives

The Committee expects more faculty will want to launch new methods of teaching that take advantage of the new tools. Although primary responsibility for the support of instruction lies with the individual schools and departments, the Committee proposes a fund for the support of computer-based innovations in instruction to be managed by a faculty committee, called the Instructional Computing Council, an analog to the University Research Council. Such a committee might have a budget of $100,000 per year to allocate in grants to faculty under a competitive application and review process. In most cases, the tools that have appeal for instruction will also have appeal for research. After all, research is how we teach ourselves something new.

The faculty in each department and program in the University will want to experiment with new workstation applications, consider the pedagogy they make possible, define strategies for bringing the appropriate applications into the curriculum, and for assessing the consequences. As particular applications pervade a given curriculum, the computing strategies will become part of the institution, included in the descriptions in the course catalogs. Teaching assignments will be made in light of the computing skills particular instructors can offer. In some disciplines, students' skills will cumulate and the threshold level of computing skill needed in upper level courses will rise as computer applications cascade through the curriculum. The following discussion presents some of the potential for the next five years. Individual departments and faculty are the key decision makers. In many areas, we have made significant starts. In no case have we exhausted the potential.

In practice across the country, law firms now build large full-text files of evidence and manage them on-line. Such computer databases allow attorneys instant recall of documents, depositions, and testimony relevant to a particular issue or current event in a case. Law firms use the full-texts of legal cases, statutes, and a substantial literature on-line from *Lexis* and *WestLaw*. The law faculty and students might want to use the same tools more aggressively in legal training. *Lexis* and *WestLaw* have been standard in education here for several years. A next step likely will be toward building and managing files of legal documents locally in support of particular courses, law review projects, clinical work, and the like.

In music, electronic tools for ear training, for composition, for producing music, and for analyzing performance are of major and growing significance.

In history, full-text files of original sources can be presented to a number of students via the network as a way of posing a historical problem. Students can interact with each other via a bulletin board, building an argument documented with information from the database. At a more advanced level, students will build their own database of notes and documents on a given topic for use in developing an historical investigation on a larger scale. With on-line reference tools, students can more easily overcome their limited sense of any given historical context by exploring biographical, artistic, and political information in reference sources.

In medicine, compound documents and the use of significant on-line databases are of increasing importance such as the databases being developed at Johns Hopkins mentioned above. Databases of clinical histories for use in medical education and as an on-line aid to future clinicians will be of value. Compound documents are a natural vehicle for turning the outcomes of medical imaging into instructional tools. For example, a video sequence of a heart beating can be embedded in a window with graphics, text, and audio track. Animated, color graphics are very valuable in understanding the fundamental biomedical science from DNA to enzymes.

In teacher training, video materials are being used at Peabody to increase the observational skills of prospective teachers. Children give many visual and auditory clues to what is going on in their minds. Video is a good way to give prospective teachers an array of observational experiences so as to learn to read a class. Video is also an effective way to expose prospective teachers to many different, effective teaching strategies. Peabody's Learning Technology Center is leading the nation in the development of these tools. We expect them to evolve into more highly interactive documents, suitable for a variety of prospective teachers.

In foreign languages, Jim Noblitt, a linguist at Cornell and one of the authors of *Système-D*, foresees computers creating "a new humanism."[8] Basic language instruction, the study of literature, and the study of linguistics will come closer together by exploring extensive full-text files in a language and in using compound documents rich with native speakers in cultural context.

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[8] James Noblitt and others. "Computers in Foreign Language Teaching and Research: 'A New Humanism'," in *Computing Across the Curriculum: Academic Perspectives*, ed. William H. Graves (McKinney, Texas: Academic Computing Publications, 1990), pp. 101-139.

Some teaching goals are shared across many schools of the University. Improved writing skills are important at the law school, in the College of Arts and Science, at Peabody, and elsewhere. Many of our effective writing teachers urge students to take advantage of word processing for its ease of revision, for its spell-check tools, and for the quality of presentation that results. Indeed, some instructors insist on it. New tools will enhance writing instruction in different ways. Many instructors find that peer review is an effective way to help students become better writers. Both the act of reviewing and of being reviewed by another student is beneficial. With the network, drafts can easily be exchanged by using the store-and-forward service of electronic mail. Indeed, a system can be devised to send a date-stamped copy of a draft to the instructor as it moves to the reviewer. The logistic problems of peer review in a paper-world are much reduced with a network.

Source materials for writing assignments can be shared electronically by the network. Students can search a much larger set of source materials in this way than can be economically shared via photocopies or even the library reserve function. For example, the University of Southern California's Jefferson Notebook provides a variety of texts on issues related to the U. S. Constitution. Students develop research skills in moving through the texts and find source material for a variety of essays. As more reference tools come on-line, students will have better support for their writing.

As with writing, mathematics is fundamental to many parts of our curriculum, especially in Arts and Science, Engineering, and Management. Some leaders on our faculty are already engaged in using powerful new tools for manipulating mathematical relationships in teaching calculus, molecular biology, and economics. *Mathematica*, for example, is software that manipulates equations symbolically, solves equation systems, and plots functions. At one level, it is a powerful research tool, offering an elegant, extensible programming language, a natural way to share algorithmic information. At another level, with its notebook interface, the reader can see text, equations, and graphics used to explain a concept in economics or physics with the programming language kept in the background. In the next few years, *Mathematica* notebooks seem likely to be available for use in teaching many concepts that are best portrayed with math.

Similarly, 40 faculty members teach statistics in six schools of the University. It is fundamental in many of our graduate programs. New workstation applications use three dimensional color graphics as tools for analyzing data and provide exciting new ways to teach statistics. For example, a 3-D scatter plot with color, shapes, and animation can make visual six dimensions. Moreover, the tools have a low threshold for first use so that even introductory students can undertake empirical exploration. The network provides ready access to data sets for classroom demonstrations, student exercises, and tests. Computer-based teaching strategies in statistics can be very significant not only in mastery of fundamental concepts but also in the usefulness of the knowledge.

In sum, the new generation of applications that is coming with the workstation generation of computers has strong potential for enhancing research and instruction in many disciplines. To be sure, learning to use these applications well will take considerable effort, often forcing a reassessment of the fundamental goals of a particular course or curriculum. Faculty members will expect appropriate support from technical staff to implement teaching strategies that make good use of the new tools. We face a challenge in mastering the new tools and in organizing ourselves to put them to effective use in our programs.

VI. Who Pays

For the most part, the preceding discussion represents a forecast of expenditure levels in the aggregate for academic computing. The largest part of the expenditures will be made by individual faculty and students in the purchase of workstations and software. The schools likely will underwrite a part of faculty purchases as they have done during the 1980's. Schools will invest in workstation labs, but we will depend primarily on individual student ownership. Other units of the University will bear responsibility for systems appropriate to their functions.

The capital cost of the trunk system has been borne centrally. Operating costs of the trunk system are borne by an annual connection fee for each bridge linked to the trunk. Local arteries and capillaries have been the responsibility of the individual units served. Local network design typically involves significant price and performance tradeoffs and must take account of the layout and space in individual buildings. It is appropriate, then, that individual units continue to bear responsibility for local networks so that tradeoffs will be faced realistically. We will face the issue of how to finance the installation of high speed network services in dormitory rooms, how to finance the installation in administrative areas, and how to finance the installation in academic areas. Building the network somewhat ahead of demand will achieve a higher level of coherence in future purchasing decisions but is difficult to achieve with decentralized finance. Building too far ahead of demand, however, is a needless expense.

Information resources have been the responsibility of the library. Services that can be licensed conveniently generally have been made available to individual members of the Vanderbilt community without incremental charge. Individual schools generally bear financial responsibility for resources of most immediate relevance to their missions. Services that involve a charge per individual user generally have such prices passed to individual users. Because many licenses stipulate that a resource may only be used within the Vanderbilt community, we must maintain accounting systems that will track use and create suitable incentives to limit use to legitimate academic purposes. Patterns of use may be tracked and used in allocation formulas used to assign taxes to schools and other units.

Support for the grants to be made by the Instructional Computing Council might be financed in the same way as the University Research Council.

Table 6 summarizes the change in expenditures for academic computing likely to come as the University adopts the workstation. It excludes major administrative processing activities.

The forecast contains two main points of uncertainty. First, how many years will be required for the workstation to be adopted and prove effective in research and instruction? This will depend in part on how rapidly unit prices continue to fall, on how aggressively the University promotes use, and in how quickly effective new applications become available at reasonable prices. Five years may be an ambitious timetable, but one that will keep our University in the position of being an early adopter of proven systems. The second uncertainty derives from the difficulty of introducing new wiring and communications equipment in old buildings. A careful survey and some creative engineering will be needed to address this uncertainty.

Table 6: Current and Forecast Expenditures

Resources	Current annual expenditure level	Expected annual steady-state expenditure in a full workstation environment,
	1990 prices	1995 equipment prices
Personal Systems	$5,000,000	$12,200,000
University Funds	$2,000,000	$3,200,000
External Funds	$3,000,000	$9,000,000
Network	$500,000	$2,350,000
Information Resources	$500,000	$1,500,000
Servers	$1,000,000	$1,500,000
Off-campus information resources (excluding supercomputers)	under $50,000	$350,000
Instructional Initiatives	under $50,000	$250,000
Total	$7,000,000	$18,150,000

The forecast of expenditure levels shown in Table 6 above is broken down by area of the University in Table 7. These forecasts are rough and ready, meant to show the kinds of expenditures and areas of the University where the most rapid growth is likely to occur. As specific proposals are generated, the details may deviate considerably from the broad brush used here. Moreover, different parts of the University may choose different ways to finance investments. Wiring, for example, might be built into mortgages for building renovation. Finally, the personal expenditures forecast for students suggests that such expenditures might be reflected in financial aid packages, an expense not estimated here.

Table 7: Responsibility for Expenditures

in thousands of dollars, annual steady-state

Unit	Current expenditure 1990 prices		Expected 1995 expenditure 1995 prices	
Personal & External		$3,000		$9,000
University Central Schools		$2,400		$4,405
computers	$720		$1,150	
network	$280		$705	
other resources & servers	$1,350		$2,300	
instructional initiatives	$50		$250	
Housing		$70		$730
computers	$0		$0	
network	$70		$630	
other resources & servers	$0		$100	
Medical Center		$950		$2,425
computers	$800		$1,280	
network	$50		$645	
other resources & servers	$100		$500	
Other Administrative		$530		$1,240
computers	$480		$770	
network	$50		$270	
other resources & servers	$0		$200	
University General		$150		$350
network	$50		$100	
other resources & servers	$100		$250	
total		$7,100		$18,150

VII. Agenda

The workstation and the network are powerful technologies that will affect many dimensions of University life. To take advantage of these technologies quickly as they prove effective, we will want to take action in seven areas:

(1) Because most of the growth in expenditures is in machinery purchased individually, the Computer Store will be of even more importance than at present. We must be prepared to add staff and space as sales at the Store grow. The Store's sales support and service operations must keep pace as well with a commitment to quality and reliability.

(2) We should install Ethernet taps to every dorm room, office, and classroom in the University within five years.

(3) The library should steadily bring more information products to Caravan.

(4) The Computer Center should continue to upgrade the link to the National Net as faster technologies arrive.

(5) Each school and department should develop plans to make effective use of workstation applications in its curriculum. Schools and departments should seek external support for course development. The University should create an Instructional Computing Council with a budget for faculty grants to encourage innovative uses of computing in the curriculum.

(6) The Computer Center should continue to develop staff capabilities to support sophisticated network and workstation technologies, seek external support as possible for network upgrades, and offer technical support to schools, departments, and individual faculty on workstation, network, and instructional issues.

(7) The Computer Center should monitor faculty interest in high speed computational servers for the network for use on a shared basis and propose suitable investments when demand warrants it.

The emergence of workstations as significant tools for teaching and research is an exciting and challenging opportunity for Vanderbilt. With our Advanced Classroom already in significant use in many disciplines, we have a head start. We are seeking external support for faculty interested in developing new pedagogy with workstations. Our Library is a leader in developing effective network-oriented information services. Our Computer Center has significant experience in building and managing the network. Several departments are developing strategies for building workstation applications into their majors. As the power of supercomputers comes to personal machines with applications in mathematics, full-text databases, imaging, animation, audio and video, a workstation and network computing environment should stimulate a significant advance in instruction and research. As a consequence, Vanderbilt will perform its fundamental missions more effectively. In terms of tools for the intellectual trades, this is the most exciting decade since Gutenberg wet his brayer.

SYSTEMS AND PROCEDURES EXCHANGE CENTER

GOALS AND MISSION STATEMENTS

ASSOCIATION OF RESEARCH LIBRARIES
OFFICE OF MANAGEMENT SERVICES

Georgetown University - Main Campus Libraries

PRINCIPLES

The Library applies automated information technologies to provide and support information resources and services as stated in the Mission Statement and the Strategic Plan according to the following principles:

1. Electronic library resources and services should be broadly accessed and provided; in addition, other University electronic information resources will be provided as appropriate.
2. Electronic information services should be available to the user from designated points inside and outside the library building as many hours a day as possible, as many days a year as possible.
3. A user should be able to access the information (bibliographic; holdings information; status information) and information resources (abstracts; full text) s/he needs from a single terminal/PC.
4. The priority for acquiring automated information technologies to use by library staff should be based upon improvement of service to the primary clientele (the more directly the technology would benefit the user, the higher the priority).
5. Equipment required, instruction provided, and services offered must be based on user and staff requirements and foster self-sufficiency and productivity.
6. Electronic access to remote information resources should supplement but not substitute for local acquisition of materials.
7. The benefit from application of automated information technologies must at least equal the costs of application.
8. The financial basis of the continuing operation of any applied automated information technologies should depend upon general operating funds rather than income from grants, endowments or gifts.
9. Whenever possible, access to information resources and the information itself should be provided without fee to the user. However, if costs are not supported fully or in part by the operating budget, the difference in costs may be passed on to the user.
10. Adherence to intellectual property laws, contracts and licenses will not be compromised.
11. The technology applied should employ standards and protocols common in local, regional, national and international environments (MS-DOS; UNIX; TCP/IP; X.25; X.400; ASCII; MARC; etc.).

22 January 1992

MISSION AND GOALS
# of the
Scholarly Communications Project

Virginia Polytechnic Institute and State University
Blacksburg, Virginia

The mission of the Scholarly Communications Project, as a pioneer in electronic publication of scholarly work, is to assist faculty, students, libraries and other users and producers of scholarly information to make more effective use of electronic communication for the benefit of the academic community.

This mission involves seeking to attain the following long-term goals:

1. Achieving high quality in publishing scholarly works, both to render outstanding service to the scholarly communities involved and to create favorable experiences among them with electronic communication.

2. Helping faculty to take greater advantage of electronic media in their scholarly communication.

3. Working with authors and users of scholarly articles in the distribution of scholarly works, to identify and overcome problems of electronic communication of those works.

4. Developing the technology and procedures necessary to improve the quality of electronic communication so that graphs, tables, scientific notation, photographs, drawings and other graphics -- some day even in color -- may be used freely in electronic journals.

5. Developing effective electronic archives of previously published articles and making those archives readily accessible and searchable by electronic means to the scholarly communities interested in them.

6. Encouragement of greater use of electronic communication in the process of editing, refereeing and typesetting of scholarly print journals.

7. Marketing, as necessary, the journals and services of the Project, both to recover some of the costs incurred and, of at least equal importance, to benefit from the real, day-to-day experience of electronic communication in the actual publishing world.

8. Encouraging the academic community to transfer more of the scholarly publishing function, and control, back to the campuses and laboratories of academe, where the scholarly work is created.

MISSION AND GOALS (Continued)

The mission involves seeking to attain the following short-term goals:

1. Offering the quarterly journal CATALYST as an electronic journal available on line.

2. Publishing the electronic JOURNAL OF THE INTERNATIONAL ACADEMY OF HOSPITALITY RESEARCH in such a way as to make it (a) a valued service to scholars in the field of hospitality research and (b) a device with which to identify and help resolve problems of publishers, authors and user/subscribers in the publication of electronic journals in general.

3. Publishing the INTERNATIONAL JOURNAL OF ANALYTICAL AND EXPERIMENTAL MODAL ANALYSIS in such a way as to (a) develop it as a valued and respected, archival scholarly publication in its field; (b) market it at a price and to the extent needed to recover most costs of publishing it; and (c) use it, without sacrificing its value or its marketability as a scholarly publication, as an instrument with which to experiment in converting a print journal to an electronic journal.

4. Developing and/or perfecting electronic archives for JIAHR, IJAEMA, and CATALYST, that are accessible to and searchable by their respective scholarly communities.

5. Exploring ways to offer all of these journals in POSTSCRIPT or other format that allows inclusion of graphics.

6. Exploring the possibilities of working with other faculty or other scholarly societies in publishing, or assisting in the publishing, of other journals or scholarly works, so as to advance the cause of effective scholarly communication.

1991 ANNUAL REPORT

Scholarly Communications Project
Virginia Polytechnic and State University
Lon K. Savage, Director

Following is a report of activities, organized by subject:

PURPOSE AND MISSION: There was a gradual shift in the purpose and mission of the Project during 1991, toward greater emphasis on establishing and encouraging electronic communication of scholarly work, especially through electronic journals, and with less emphasis on establishing a publishing operation dealing in both print and electronic media. This revision in purpose and mission was accomplished through several meetings with the Vice President for Information Systems, Director of Communication Network Services, and Director of Libraries, and in writing a new Mission and Goals Statement.

ORGANIZATION: The Project was moved from Communication Network Services to the University Libraries where it could work more closely with Library interests and enjoy the benefit of Library personnel support. The Project's Steering Committee was enlarged in mid-summer to include representatives of the journals involved, as well as representatives of such fields as electronic communication and marketing.

INTERNATIONAL JOURNAL OF ANALYTICAL AND EXPERIMENTAL MODAL ANALYSIS: On January 1, 1991, the Project, for the University, assumed full control of this journal. As a new operation, we developed a fulfillment operation, including software, for the recording of subscriptions and payments and the generation of invoices and mailing labels; designed a new invoice; sent invoices to all subscribers for renewals; and performed customer services in recording and responding to all payments, new subscriptions, cancellations and claims -- a time-consuming activity in the fall. We also attended the SEM annual meeting in Albuquerque during the summer. We also devoted much time and effort to working out a payment arrangement with SEM for the printing services we perform. In IJAEMA marketing, we sent the Five-Year Cumulative Index to about 200 recent authors urging them to support the journal; letters to about 50 current authors asking them to urge their libraries to subscribe; letters to some 30 graduate students who attended a modal analysis short course in Michigan urging their support of the journal; letters and journal copies to about 150 faculty active in modal analysis urging them to subscribe and to ask their libraries to subscribe; letters to all institutions that did not renew their subscriptions; news releases to subscription agencies, news media and special lists about the change in ownership and; and news releases to engineering publications about a special series of tutorial articles. At the SEM annual meeting in Milwaukee we helped arrange a special offer of IJAEMA subscriptions to those attending the International Modal Analysis Conference, then arranged and wrote an Insert in the IMAC Program advertising the offer. As of late January, 1992, institutional circulation has increased about 5% from the same date in 1991, despite the fact that some 25% of last year's subscribers did not renew. Member subscriptions held steady; however, prospects appear good for increased numbers of member subscriptions in 1992 because of the special offer arranged in 1991.

We made first efforts to organize a corporate sponsor program for IJAEMA.

Efforts to promote electronic communication of IJAEMA have had limited success. A first attempt was made in the Library at making IJAEMA available as a Postscript file; it demonstrated both progress and problems. An offer was made to make the journal available for transmission in a Bitmapping arrangement with other universities, but it was not accepted. Placing of the IJAEMA abstracts on the Internet generally was not maintained up to date and has yielded little interest. An effort by Tom Head's office to prepare graphics in Postscript form resulted in publishing erroneous graphics, much to the publisher's embarrassment. However, these problems have helped identify new possibilities and directions for future efforts, with the result that greater progress is anticipated in the future.

THE JOURNAL OF THE INTERNATIONAL ACADEMY OF HOSPITALITY RESEARCH: A lack of faculty support for this journal became increasingly evident during the year. The Director devoted much time early in 1991 to subscription sales, subscriber problems, and the general administration of an electronic journal. These efforts succeeded in helping to create an understanding of the real problems confronting electronic journals from the standpoint of subscribing libraries, subscribing individuals, authors and publishers. We developed a paid subscription list of about sixty, including more than thirty research libraries, all over the world; initiated a conferencing capability of the editors, JIAHR TALK, to encourage discussion among subscribers; sent out the firt three issues in hard copy; and published the second, third and fourth issues of the journal electronically. Because of the small number of issues and the lack of support which this reflected, the Director traveled to the annual meeting of the Council of Hotel, Restaurant and Institutional Educators (CHRIE) in Houston in the summer to promote support. Although subscriber interest was increased, the same problems of editorial support and limited submissions continued. With the decision to give away all renewals, we had little to do with the journal in the last quarter of the year, except to put out Issue # 4. Mike Olsen, president of the sponsoring Academy, failed to attend a Steering Committee meeting which had been rescheduled specifically for him. A careful analysis of this journal's prospects is needed.

CATALYST: After discussion with the editor, Darrel Clowes, and working with him in a slow, painstaking process, we were successful in placing this journal on line in an electronic format, available at no charge on Bitnet and the Internet. Announcement of this electronic journal was made in January, 1992, with the placement of two issues of the journal on line. Procedures are established to place all future issues on line for electronic subscribers, with hopes to archive all past issues (quarterly for twenty years) on line, too.

JOURNAL OF TECHNOLOGY EDUCATION: After discussion with Mark Sanders, we began placing this bi-annual journal on line, to begin in February, 1992. We are in process of doing this at year's end.

OTHER POSSIBILITIES: Curtis Finch indicated in May an interest in launching an electronic journal in the field of vocational education; after considerable discussion, he is considering the possibilities. Steve Parsons of the Education faculty is beginning an On-Line Journal of Community Education, and we will work with him. Joe Sirgey, Professor of Marketing, is planning to launch an electronic journal in Quality of Life Studies.

Washington University-St. Louis Libraries

Washington University Assumptions

Change in chancellor within five years
Basic campus structure unchanged
Stable enrollment
University focus on strengths
More interdisciplinary and area studies
Push to attract and retain undergraduates
More non-traditional students
University-wide planning but strong power bases in schools
Expanded capacity for Olin Library System

THE FUTURE WASHINGTON UNIVERSITY LIBRARIES

Collections and Services

The Libraries will be an information center for both print and electronic resources. We will have new collections and services but will also maintain many of our traditional services.

The definition of excellence will be in transition, with traditional measures being examined for their contribution to quality of access to information and being retained or revised based on the results of that examination.

USER CONVENIENCE will be the credo of the Libraries.

Our collections and service policies will be flexible and responsive to current needs.

Collections and services will reflect the varying needs of the components of our community, with services to undergraduates of more importance than in the past.

Access to information will be greatly improved through regional and national cooperative agreements. The mechanisms for improvement will be online catalog development, enhanced interlibrary loan, electronic mail, use of traditional and new delivery methods (fax...).

Libraries will be cognizant of information overload and their roles in alleviating its negative effects. Libraries will market their services as information guides, working with faculty and students to encourage one-on-one and in-class instruction in information-seeking methods.

We will provide more and varied user aids for navigating through information sources, reflecting the varied levels of need and expertise in our user community.

Subject expertise and functional ability to bring all the services of the libraries together for an individual user's needs will be critical for staff. Specialized and personalized services will expand.

Hours of service and staff coverage will be expanded to match the varied hours of our communities.

Physical Facilities

The quality of physical facilities will be important to attract students and faculty from a declining pool.

Space will be organized to reflect the needs for readers to use the collections in formal and informal settings, to study individually or in groups.

There will be a marbling of technology throughout the library - photocopiers, microcomputers, VCR's, microform equipment. Maintenance and upgrading of the equipment will be a high priority.

Facilities in the library will be planned as part of the total campus physical and technological environment.

The physical organization of a large central library with satellite subject libraries and storage facilities will continue and will become more effective as electronic links are strengthened.

Technology

There will be full exploitation of technology for internal processes, using all modules of the Notis system, plus electronic mail, telefacsimile, and personal computers.

The Libraries will take a position of leadership within the University community in the provision of access to electronic information.

The online catalog of the holdings of the Libraries will be complete and will be augmented by access to other bibliographic, numeric, and full-text databases.

There will be user-friendly links from the Libraries and from users desks to other catalogs in the region and the world.

Staff with sophisticated knowledge of computers and telecommunications will be a resource for other staff with "end-user" knowledge levels.

Organization of the Libraries

A strong dean will represent the Libraries to the University and the outside world. The dean will generate political and financial support within the University and raise money from outside sources.

The Libraries will have come from a position of disadvantage to a position of leadership in the provision of information.

The Libraries will plan services with other Washington University Libraries and with regional and national information providers.

Flexibility in budgeting will provide for the use of funds in ways that support innovation as well as continuation of some traditional services.

Within the Libraries, the organization will be flatter, with closer working relationships for technical and public services. Working with ad hoc groups will supplement and partly replace working along hierarchical lines.

The staff will be larger. There will be more emphasis on subject skills. There will be more non-librarian functional specialists.

A high level of technological literacy will be common in the staff.

Because of a rapidly changing environment, staff training and development will be constant.

2/91

SYSTEMS AND PROCEDURES EXCHANGE CENTER

INFORMATION SYSTEMS

ASSOCIATION OF RESEARCH LIBRARIES OFFICE OF MANAGEMENT SERVICES

Colorado
State
University

University Public Relations
Office of Public and Media Relations
Fort Collins, Colorado 80523
303/491-6432

NEWS

COLORADO STATE UNIVERSITY'S INTERLIBRARY LOAN SERVICE ACCESSIBLE FROM PERSONAL COMPUTERS

FORT COLLINS, Oct. 2--Colorado State University Libraries' new electronic access allows its patrons to request interlibrary-loan items 24 hours a day, seven days a week from a home or office computer.

Interlibrary loan allows people seeking publications not in the university's collection to borrow such items from other libraries. Now, through electronic access, library patrons can conduct several interlibrary-loan transactions from across campus, across town and even from other parts of the state. They can request books, articles, reports and other documents; ask for interlibrary loan renewals; and conduct status checks on requested materials.

The system is easy to use even with minimal computer experience, said Julie Wessling, Interlibrary Loan's head librarian. "It certainly is more efficient."

Electronic access requires a computer with a modem or terminal with access to PACX or CSUnet. The program is loaded on the LAMAR UNIX mainframe to streamline the interlibrary request process. To enter the system, users must access LAMAR and type "ill" at the login prompt. Prompts on the computer screen lead

-more-

the user through the request process.

The system is a help to distance learners, Colorado State Cooperative Extension personnel and other remote users who cannot make a personal visit to the library.

"A student from Loveland was one of our first users," Wessling noted.

To make the process even simpler, Interlibrary Loan can send requested articles and other short documents to library patrons by FAX. "That really keeps off-campus personnel and distance learners in the loop," Wessling said.

Colorado State's Office of Information Technology funded the project and provided hardware and programming assistance. Student programmers assisted with the effort.

The service is relatively new among universities, Wessling said. Although Colorado State's system is modeled after others, it is tailor-made for Colorado State University Libraries.

For additional information or to receive an instructional brochure, stop by or write to Interlibrary Loan, Room 210 Morgan Library, Colorado State University, Fort Collins, CO 80523 or call (303)491-1868.

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Information Arcade

The Staff of the University of Iowa Libraries
invite you to a Grand Opening
of the
Information Arcade!

Friday, September 25, 1992
2:30 - 5:30 p.m.

Information Arcade
First Floor, Main Library

Demonstrations — 2:30 - 5:30

A variety of Arcade resources will be demonstrated, including the following:

1. HytelNet. A hypertext database of Internet addresses and resources. Demo's on both the Mac and IBM. Will show how to access remote databases and transfer files.

2. Hypertext Dissertations (Dickens, Post-Colonial English writers)

3. Online tour of Toolbook, a Windows-based authoring tool.

4. Demo of the Annotator, an authoring tool developed by Second Look Computing.

5. The Visual Almanac, a multi-media package of spatial data.

6. Quicktime video of Democratic and Republican conventions.

7. The Electronic Encyclopedia.

8. Ofoto, Superpaint and Pagemaker as used in the production of the Arcade newsletter.

9. Images of the French Revolution.

10. Cruise of the Internet, a demo package to teach Internet navigation.

11. Perseus 1.0, interactive sources of study of ancient Greece.

Opening Ceremony
Main Library, North Lobby — 4:45 p.m.

Sheila D. Creth, University Librarian
Peter Nathan, Vice President for Academic Affairs
Roger Hughes, Executive Director, Roy J. Carver Charitable Trust

Reception Following in North Lobby

The Information Arcade, supported by a generous grant from the Roy J. Carver Charitable Trust, is a state-of-the-art facility developed to provide access to information in electronic format and an electronic classroom for teaching by faculty and librarians.

The University of Iowa
Iowa City, Iowa 52242

The University Libraries

1847

NEWS RELEASE

UI LIBRARIES RECEIVES CARVER GRANT

The University of Iowa has received a grant of $752,432 from the Roy J. Carver Charitable Trust to establish the Interactive Information Learning Center (IILC). The Center, to be located in the Main Library on the Iowa City campus, will provide members of the university community with services and technology to acquire sophisticated information skills and obtain access to a range of information resources in a variety of electronic formats. The facility will have a classroom equipped with 26 workstations, and another 56 workstations for individual and group activities for a total of 80 state-of-the-art workstations. There will be access to bibliographic and full-text databases as well as a variety of software to support computer assisted instruction as well as access to communication networks for classroom teaching and individual projects.

The Center will provide a place where faculty and students can gain assistance from librarians and computer professionals in the use of an array of information technology. "The goal of the Center is to bring new information technologies into the teaching and research process of the UI campus, using the library as the primary focus in order to link traditional print materials to the electronic information resources," says University Librarian Sheila D. Creth.

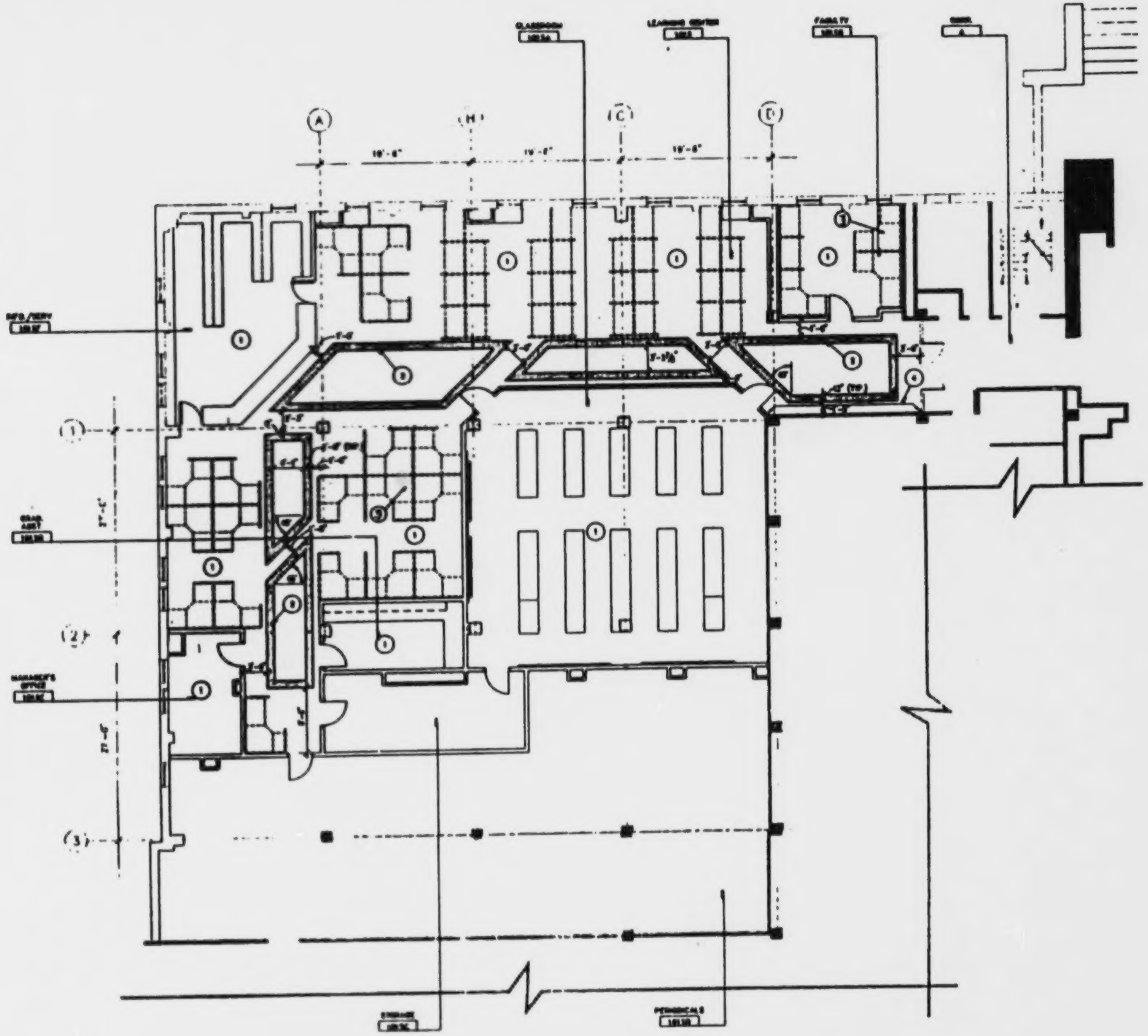
The proposal for the Interactive Information Learning Center was developed as a collaborative effort by librarians, faculty and technologists on campus. This collaborative approach will be sustained in the development of services for the Center and in the evaluation of services and programs over the next three years.

The emphasis on the Center will be service -- people helping people to use information technology in creative and innovative ways to support undergraduate teaching, independent learning and research. Roger Hughes, Executive Director of the Carver Charitable Trust summed it up when he said, that the Interactive Information Learning Center is the "shape of things to come. We hope that it increases the capacity of the Library to serve its constituencies and become a model in the state and region for the effective use of technology in the teaching-learning process."

The Carver Trust was established in 1982 by industrialist Roy J. Carver to support medical and scientific research, scholarships for disadvantaged students and other university programs. The grant from Carver Trust provides support for three years after which The University of Iowa will provide full financial support for the Center.

Further information about the Interactive Information Learning Center can be obtained by contacting: Larry Woods, Director Information Systems and Technology, University of Iowa Libraries, Iowa City, Iowa 52242.

May 1991



INTERIOR DESIGN PLAN

THE UNIVERSITY OF IOWA

LIBRARIES NEWSLETTER

THE UNIVERSITY OF IOWA LIBRARIES INTERACTIVE INFORMATION LEARNING CENTER

In May of 1991, the University of Iowa Libraries received from the Roy J. Carver Charitable Trust a grant of $752,432 to establish the Interactive Information Learning Center (IILC). This facility is intended for the support of undergraduate teaching, independent study, and research.

The proposal for the Center was developed as a collaborative effort by librarians, faculty, and technologists on campus, an approach that will be continued in the development and evaluation of the Center's services and programs for the three-year duration of the grant.

Planning for the services and operation of the Center is being carried out by a number of faculty and staff. An advisory council consisting of fifteen faculty, librarians, and computing specialists was appointed in July. Task forces drawn from this group and joined by approximately sixteen other faculty and staff are developing recommendations for the operations of the Center, for the software and databases to be provided, and for the instructional programs that will be offered.

The Center, to be located in the Main Library, will provide faculty, students, and staff with the technical resources and services needed for learning advanced information skills and for acquisition of information in a wide variety of formats.

Detailed construction planning began immediately after the award of the grant in May of 1991; formal design work was completed in early December. Construction will begin in early 1992 and should be complete by mid-summer. Full operation is expected by the beginning of the fall 1992 semester.

The Center will occupy 6,000 square feet in the northwest corner of the first floor of Main Library.

The space will be remodelled in accordance with current standards for computer facilities and electronic classrooms. This work will be funded from the Carver Trust grant and from University sources.

Continued on page 6

The University
Libraries
Campus
Information
Services
Network

VOLUME 20
NUMBER 2
JANUARY 1992

Electronics in Libraries: Breaking Ground for the Future, Keeping Faith with the Past

In this issue of the *Newsletter* the lead story describes the genesis of a new type of instructional and information facility. Many of the articles that follow report on developments in scholarly communication and provision of information that have been made possible through computer-based systems.

Those already convinced of the merits of these new techniques will find much here that will confirm their faith. Those harboring doubts might wish to reflect on a motto attributed to IBM: "Machines should work. People should think." The technologies described in the first feature and elsewhere are tools that both remove much of the travail from scholarship and extend the potential for discovery and scholarly cooperation. The methods have changed, but the goal remains the same.

The CRL Tapes: A New Database in the OASIS System

In November, the Libraries added the catalog of the Center for Research Libraries (CRL) to OASIS. The database contains records describing a large percentage of the materials held by CRL.

The Center, of which The University of Iowa is a member along with 150 other university, college, and research libraries, is headquartered in Chicago and has a collection of over 3.6 million volumes and 1.1 million microforms.

The CRL holdings, few of which are duplicated in The University of Iowa collections, include archival materials, scientific and technical works, dissertations from outside the U.S and Canada, major microform and reprint sets, newspapers, state documents, materials supporting area-studies research on Africa and Asia, and works in a wide variety of other disciplines.

On OASIS, the CRL database can be accessed by typing its identifier, CRLC, at the introductory screen or any other OASIS screen.

University of Iowa faculty, staff, and students may request materials located at CRL through the Interlibrary Loan Office in the Main Library. ■

Lawrence Woods
Director, Information Systems and Technology

Electronic Distribution of Uncopyrighted Reserve Materials in the Engineering Library

Uncopyrighted reserve materials account for a significant portion of undergraduate reserve use of the Engineering Library. These materials, comprising lecture notes and homework and test solutions, require a great deal of library staff time to maintain. Heavy use of reserve items, especially before exams, has made it increasingly difficult to provide students with timely access.

As a remedy, the engineering librarian in late 1989 proposed that an online reserve system be established on the Iowa Computer Aided Engineering Network (ICAEN) within the College of Engineering. This network uses Macintosh and Apollo equipment as platforms.

In the spring of 1990 the Engineering Library received a grant of $7,500 through The University of Iowa Strategic Planning Initiative Program to begin this project. The necessary hardware was purchased during the summer of that year.

During the fall of 1990 the engineering librarian, with technical support and other assistance from Chris Fomon and Douglas Eltoft of ICAEN, developed the prototype. The system is a fileserver mounted on ICAEN. Data entry is via Microsoft Word documents and HyperCard stacks. It is also possible to scan

Continued on page 3

THE UNIVERSITY OF IOWA
LIBRARIES
NEWSLETTER

EDITOR
Jeffrey Dodd

ASSOCIATE EDITORS
Richard Kolbet
Marianne Ryan

EDITORIAL COMMENT

Please address comments to the Editor, Administrative Offices, The University of Iowa Libraries, Iowa City, Iowa 52242 or by E-Mail at CADDODTS @UIAMVS.BITNET.

The *Newsletter* is published twice a year by The University of Iowa Libraries and is mailed free of charge to University of Iowa faculty, Friends of The University of Iowa Libraries, and research libraries throughout the United States and Canada.

This publication is made possible through generous financial support from the Friends of The University of Iowa Libraries.

handwritten materials into the system using a Hewlett-Packard Scanjet scanner. Images are scanned as MacPaint documents which are then converted into Microsoft Word documents for distribution.

A small-scale test during the spring of 1991 was successful, and full-scale operation began in the fall of the same year. Currently over 22 megabytes of materials for 20 different undergraduate courses taught by 15 different professors are available on the system.

Students access materials from the ICAEN labs, and may view the materials on a computer screen, download the materials to disk, or print copies using printers in the labs.

Response from faculty and students has been both positive and extensive. The library reserve system is accessed over 1000 times a month by undergraduate students, and at times use has been high enough to cause delays in printing materials. In light of the heavy use made of the system and the experience gained from running it during the fall of 1991, plans are being made to introduce a number of improvements.

The fileserver will be moved from Macintosh to Apollo computers to take advantage of the higher image resolution of the Apollo screens. If funds can be found, a 1 gigabyte optical drive will be added to the system. The establishment of a small cluster of Apollo workstations and laser printers in the Engineering Library is also being considered. With this change, access to the reserve system would be possible in the Engineering Library on the same basis as it is in the ICAEN labs. Additional improvements to the system will be made as funding allows.

The online reserve project has been successful both in accomplishing its purposes and as an example of what can be achieved now in realizing the potential of the electronic environment that almost certainly represents the future of academic libraries. ■

John Forys
Engineering Librarian

Government Documents Databases at Iowa

Some of the first CD ROM (Compact Disc Read-Only Memory) sources received in the Government Publications Department (GPD) were commercially produced indexes to government documents and technical reports, for example, *GPO Silver Platter* and *NTIS Silver Platter*. Similar indexes are also available for Congressional publications from 1789 to the present.

More recently the federal government has begun using CD ROM and floppy disk technology to distribute data files, many too large for other means of release, to depository libraries and the public.

Census data files are among the largest produced by the government. Along with basic paper reports, data from the 1987 Economic Censuses and the 1990 Population and Housing Census are being issued on CD ROM discs.

So far the Government Publications Department has received the 1990 redistricting data, the 1990 age/race/sex figures, and most of the 1987 Economic Census data in CD ROM format. Socioeconomic data from the 1990 sample questionnaires such as labor force status, income, and education, will be on discs slated for fall 1992 release. The Census Bureau has also issued CD ROM versions of *County Business Patterns, Export/Import Data, and County and City Data Book*.

These discs are designed to be used with dBase III database management software that allows custom data manipulations. For those who can use the figures as supplied, each disc from the 1990 census has "go" software which enables users to find and either download or print desired information quickly.

Another CD-ROM product from the Commerce Department is the *National Trade Data Bank (NTDB)*, received monthly and currently housed in the GPD. *NTDB* files cover trade promotion information and international economic data from 15 federal agencies.

NTDB includes market research reports, which detail economic, political, and social forces affecting U.S. marketing in various countries; tables from the University of Massachusetts MISER program, displaying state of origin of exports by SIC code and by country of destination; the *World Factbook*; the *U.S. Industrial Outlook*; a foreign traders' index containing names and addresses of foreign trade contacts; and many other files of interest to researchers.

These electronic products have proven effective in retrieving information from a group of materials that are both too extensive and too complex to be searched efficiently in any other way. ■

Mary McInroy
Reference Librarian
Government Publications Department

Electronic Data Sources for the Humanities

Scientists and engineers, forced at an early date to adopt computers as a means of managing vast quantities of numerical data, have found these machines increasingly useful in other aspects of their craft. Humanists, lacking this kind of pressure, have until relatively recently found little enticing in the world of electronics, save perhaps its history. This situation is rapidly changing.

Leaving aside word processing and other extensions of the typewriter, the most obvious use humanities scholars make of computing technology is in the searching of indexes to literature. Electronic searching is possible in all areas of the humanities. Typically this covers materials only as far back as 1980, but one major index, *Arts and Humanities Citation Index*, goes back to 1975.

Of importance to the scholar of literature is the CD ROM (Compact Disc Read-Only Memory) based *Index of the Modern Language Association*, recently purchased by the Libraries. This product, which is being used with increasing frequency, indexes language and literature journals, dissertations, and many chapters of books, from 1981 to date.

Perhaps the most significant electronic advance to come to the humanities is the growing corpus of full texts now available. Scholars worldwide are carrying out projects to put both classic and minor texts into electronically readable formats. The effort to develop texts that are authoritative, complete, and encoded for a wide range of analysis is considerable.

The Libraries owns a number of these electronic versions: The Bible; the complete works of Shakespeare; the poetry of Milton; treatises by Locke, Berkeley, and Hume in an edition called *Past Masters*, and a wide variety of American literary and patriotic texts, which can be found on a compact disk called *WordCruncher*.

These sources augur well for a fascinating future in humanities scholarship. Though "paper free" research is, to be sure, very much a matter for that future, the days when scholars could disdain the use even of a typewriter are passing quickly. ■

Helen Ryan
Reference Librarian

Washington Post Ondisc

Obtaining access to national and international news has always been a matter of critical importance for library users. Students, faculty, and other researchers frequently turn to newspapers for information on domestic political events, foreign affairs, social and economic trends, and issues related to defense and military activities. Providing this access has presented a myriad of problems for every reference department.

Until recently, the mechanism for retrieving information from a newspaper was the printed index to that paper. Although ultimately effective, the search for information through printed indexes is often cumbersome and time consuming, especially when there is uncertainty about the date of publication. Now, the Reference Department in the Main Library is able to offer access to the text of an important U.S. newspaper, the *Washington Post*, via the *Washington Post Ondisc*.

The *Washington Post Ondisc* is a full-text database on CD ROM (Compact Disc Read-Only Memory) covering articles published in the *Post* since January of 1989. The database comprises the news and editorial content of the daily and Sunday editions of the paper, including regional, national, and international news stories; analysis; editorials and opinions; and letters to the editor. It also contains feature articles, reviews of cultural events and books, and articles on sports, business, and finance. Bibliographic references without full text are available for news wire stories and syndicated columns.

The reference staff is delighted to be able to offer library users the enhanced access represented by *Washington Post Ondisc*. Current and retrospective news coverage provided in this way extends that already available at Iowa through the print versions of the *Post* and its index.

The Libraries also has electronic bibliographic access to other newspapers via *Newsbank*. This index, located in the Reference Department, covers articles of local, regional, national, and international interest from 400 newspapers. In addition, the Department can arrange mediated searches of the contents of newspapers through the DIALOG Information Retrieval Service.

If you wish to learn more about the *Washington Post Ondisc* or about other electronic sources available through the Reference Department, please feel free to consult with reference staff in person or by phone at 335-5299. ■

Janice Simmons-Welburn
Head, Reference Department

Library Navigator:

An Electronic Introduction to the University Libraries

Library Navigator is a computer program that provides an introduction to the University of Iowa Libraries, emphasizing the Main Library. It was developed at the Libraries and was introduced to the public in July, 1991.

The program indicates the locations and purposes of the twelve libraries comprising the University Libraries system, describes important service points and collections in the Main Library, explains policies and procedures, and acquaints users with types, formats, and locations of reference sources. *Library Navigator* makes strong use of the visual element by incorporating pictures, floor plans of the Main Library, and a map of the UI campus.

The *Library Navigator* was conceived as a means for providing students, faculty, staff, and visitors with an alternative source of basic library information, particularly at times when the information and reference desks are closed or when the reference staff is answering questions for other patrons. Meeting these needs was considered a top priority by the Libraries' task force on computer-assisted instruction, which recommended development of the program. Work on the project commenced in October of 1990.

Production of the *Navigator* was a team effort. Reference librarians Marsha Forys, Rebecca Johnson, and Janice Simmons-Welburn devised the content. Systems analyst Doug Lonowski created the program and provided expertise in instructional design.

A systems approach to instructional design was used which involved the following steps: identifying goals; conducting an instructional analysis; identifying entry behaviors and characteristics; writing performance objectives; developing instructional strategies; developing the software; designing and conducting a formative evaluation; revising the software; and implementing the program.

The prototype seemed to work well when tested by library staff, but the question remained whether it would do the same for its intended users. To answer this, a questionnaire was developed to elicit feedback about the program, and data was collected in the program's first ten weeks of public use. Responses to the questionnaire prompted refinements to the software.

Overall, reaction to *Library Navigator* has been quite positive, complimentary, and supportive. Perhaps the most gratifying comments were similar to this one: "I was lost and here it was... I learned a lot. It made me feel much more comfortable about using the library."

A majority of users found *Library Navigator* very easy to use. Most respondents indicated that they learned new things about the library from this program, would use it again, and would use it if it were available in the Instructional Technology Centers on-campus or in their homes. Students new to the campus found the program particularly helpful.

At the present time, *Library Navigator* is available at two stations near the information desk in the Main Library. Additional locations, such as the Instructional Technology Centers, the Rhetoric Department, and the Honors House, are currently being considered to make the program more widely available on campus.

Library Navigator requires HyperCard 2.0 or newer and will run on any Macintosh computer that meets the following requirements: 2 megabytes of RAM, Macintosh Operating System 6.0.5 or newer, and at least 1 megabyte of free hard drive space.

Copies of *Library Navigator* will soon be available via the Apple Library Template Exchange. For more information about the *Navigator* or its availability, contact Marsha Forys, User Education Coordinator, Reference Department, University of Iowa Libraries, Iowa City, Iowa 52242. Phone: 319-335-5301 or E-Mail: cadrysts@uiamvs.bitnet. ■

Doug Lonowski, Systems Analyst

Marsha Forys, Reference Librarian

Rebecca Johnson, Reference Librarian

Janice Simmons-Welburn, Head of the Reference Department and Coordinator of Systemwide Reference Services

Internet: Pathway to World Information Resources

Faculty, students, and researchers at The University of Iowa are now able to access information resources throughout the world via Internet, an electronic network linking hundreds of academic, research, and governmental networks and computers. Internet procedures allow users to initiate a connection to a remote machine, login, and use that resource as though the workstation and remote computer had a direct connection.

One feature of the Internet that should be of considerable value to researchers at Iowa is the access it provides to over two hundred on-line library catalogs throughout the United States and abroad.

Knowledge of the holdings of other libraries has obvious value for researchers seeking information in areas that reach beyond the scope of the University of Iowa Libraries' collections, particularly when visits to other institutions are contemplated. Results of Internet searches can also be used as a basis for interlibrary loan requests. A list of Internet-accessible catalogs can be obtained at the Main Library reference desk.

In addition to library on-line catalogs, there are many other databases that can be searched via the Internet. While some, such as SIMBAD (Set of Identifications, Measurements and Bibliography of Astronomical Data), require an account at the remote site, others do not. PENpages, maintained at Pennsylvania State University, is an information service containing reports, newsletters, and fact sheets on agricultural research and consumer issues. PENpages is a free service available to anyone with Internet access.

Searching databases and library catalogs is an important feature of Internet, but there are others that should also prove valuable to scholars.

FTP, the File Transfer Protocol, allows the user to transfer files quickly from machine to machine. These files may include text, software programs, and graphics. As with remote login, some files are available free of charge while others require an account and user ID at the remote site.

Electronic mail, already familiar to many at Iowa, is available on the Internet as an efficient and inexpensive way to communicate with colleagues around the world. E-mail can be useful for sharing works in progress, verifying findings, or initiating discussion.

During the spring 1991 semester, the Reference Department offered four ninety-minute workshops entitled "Using the Internet to Search Worldwide Library Catalogs" through the Weeg Computing Center. These workshops, emphasizing search strategies and providing hands-on experience, will be repeated during the spring 1992 semester.

Available guides to Internet resources include *Internet-Accessible Library Catalogs and Databases*, compiled by Art St. George of the University of New Mexico and Ron Larsen from the University of Maryland; *Internet Resource Guide*, distributed on-line and in paper by the National Science Foundation Network Service Center; and the University of North Texas *Accessing On-line Bibliographic Databases*, distributed on-line via Internet's file transfer utility.

Software tools, based on one or more of the available directories, are also being developed and are usually available to the user via Internet's file transfer utility.

At The University of Iowa, Internet access is available through the University's Ethernet network or by dial-access to most of the Weeg Computing Center mainframes. For more information on Internet access, contact the Weeg User Consultants, 18 Lindquist Center, at 335-5530. ■

Suzanne Olson,
Information Specialist

Janice Simmons-Welburn,
Head of the Reference Department
and Coordinator of Systemwide
Reference Services

Directory of Electronic Journals, Newsletters and Academic Discussion Lists

What do people interested in science fiction, disaster research, Old English, early medieval China, stagecraft, phylogenetics, and laser medicine have in common? All of them can pursue these interests and many other topics by way of electronic journals, newsletters, and discussion groups available over the Internet and related computer networks.

Until now it was hard to find out about the existence of such resources, and how to get access to them. The Association of Research Libraries has sought to remedy that situation by publishing the *Directory of Electronic Journals, Newsletters and Academic Discussion Lists*, compiled and edited by

Michael Strangelove, Diane Kovacs, and Ann Okerson (Washington, DC, 1991).

The *Directory* lists electronic resources available through networks, gives as much information as the editors were able to gather about the purposes and intent, and—more importantly—tells how to become a member or subscriber. It covers two kinds of online information sources.

The first section deals with electronic journals and newsletters, such as the *Distance Learning Online Symposium*, *Bryn Mawr Classical Review*, and *Canopus Magazine* (a newsletter from the American Institute of Aeronautics and Astronautics). Some of these newsletters and journals, like *Postmodern Culture and Psycoloquy*, are peer reviewed.

Anyone with a computer account that allows use of the Internet or Bitnet can access most of these publications at no direct cost by sending a one-line command to the host computer, but a few, such as *Tetrahedron Computing Methodology* and the *Journal of the International Academy of Hospitality Research*, require payment of subscription fees.

The second part of the *Directory* provides information, by subject, about discussion groups, known as "lists," available on the networks. These lists are essentially long-distance conversations among a community of participants about topics as broad as history and agriculture or as specific as the Vietnam War and brine shrimp. Many of these discussion groups are highly focused, mirroring the specialization of the academic world, and new ones seem to spring into being at an astonishing rate.

A speaker at the Symposium on Scholarly Communication held at The University of Iowa in November reported that network traffic was increasing at the rate of 20% per month. The emergence and popularity of these electronic forums have been a major reason for this growth.

Print copies of the *Directory* may be examined in the Reference Department of Main Library, in the Engineering and Business Libraries, and in the Hardin Library for the Health Sciences. On page five of the *Directory* are instructions for retrieving it as a computer file from a number of network sources. ■

Edward Shreeves
Director, Collection Management and Development

IILC

Continued from page 1

The IILC will differ from other Information Technology Centers (ITCs) on campus in that it will be linked closely with the electronic resources of the Libraries and will be staffed by information professionals to assist in the use of technology in creative and innovative ways.

At the heart of the facility will be an electronic classroom equipped with 25 workstations and accommodating up to 47 students. It will be fully networked, allowing an instructor to view a particular student's work, to display the same information at all stations, or to allow several or all students to work cooperatively on a project. State-of-the-art projection and sound equipment will allow integration of text, sound, graphics, and full motion video into the same computer program.

In addition to the classroom, there will be another 56 workstations in the Center supporting a wide range of information applications. Many of these workstations will support development of multi-media materials such as those used in the classroom. A separate cluster of workstations in an enclosed area will allow faculty to work privately on projects.

All workstations will eventually be networked to campus and library electronic resources and will have worldwide access to information resources via the Internet, an electronic network linking institutions of higher education. (A description of the Internet may be found in a later article in this issue.)

Users of the Center will be able to obtain assistance at a desk staffed by information professionals and graduate students. Resource materials, both electronic and traditional, will be shelved at this desk for use in the Center.

The Center's electronic resources will include some, like OASIS and electronic mail, that will be accessed through off-site mainframe computers. Others, particularly CD ROM (Compact Disk Read-Only Memory) databases, will be mounted on equipment within the IILC itself. Of the CD ROM sources a number will be permanently connected to equipment that will permit simultaneous access from several workstations. The rest will be available at the information service desk for loading into drives connected to individual workstations.

Other resources in the Center will include programs and packages supporting instruction in a variety of subjects. While some of this software will come from commercial sources, a significant portion will be materials developed at Iowa or other educational institutions.

Developmental or "tool" software will also be available for use in the Center. Beyond word processing, spreadsheet, and database programs, there will be software for developing multi-media programs, slides, and other teaching materials.

Pending completion of remodelling, a temporary cluster of workstations similar in function to those that will be located in the Center is being installed on the second floor of Main Library near the north bank of elevators. These stations will be used during the spring 1992 semester for pilot projects demonstrating potential uses of the Center to interested faculty.

In its planning stages the Interactive Information Learning Center has attracted the attention of information professionals from around the country and abroad. When complete, the IILC will provide The University of Iowa with a resource that may well set the standard for the combination of instructional technology with electronic information services. Innovative thinking, coupled with adequate funding, should allow Iowa to maintain its leadership in this field. ■

Lawrence Woods
Director, Information Systems and Technology

Heirs of Hippocrates, Third Edition

The third edition of *Heirs of Hippocrates*, the catalogue of the Hardin Library for the Health Sciences' collection of historic books on the development of medicine, was published in early November. by Richard Eimas, curator of the John Martin Rare Book Room, and is available from The University of Iowa Press for $125.

The majority of the works represented in the catalogue came to The University of Iowa as gifts from Dr. John Martin, a retired neurosurgeon who resides in Clarinda, Iowa.

Dr. Martin received his M.D. degree and Ph.D. in anatomy from Northwestern University and taught and practiced there for many years. Only a person with an extensive background in the theory and practice of medicine could appreciate the full significance of medical history and only a dedicated bibliophile would attempt the daunting task of documenting it. Dr. John Martin is of that rare group of scholars who are both. To him we owe not only the content of the collection described in the catalogue, but its structure.

The works described are landmarks of medical publishing that span five centuries. The catalogue is thus a chronicle of medical bibliography that should prove a valuable contribution to the fields of medical history and historical bibliography.

The oldest books listed in the catalogue are two written by Jean Gerson, a noted French theologian, scholar, and teacher of the fifteenth century, and published at Cologne in 1470. Hippocrates, Aristotle, Dioscorides Pedanius of Anazarbos, and Galen are among the important early authors represented.

Two of the rarest and most important books in medical history, Vesalius's *Epitome* (Basel, 1543) and Harvey's *De motu cordis* (Frankfurt, 1628), are also among the holdings listed in the catalogue.

Major later authors include Giovanni Battista Morgagni, Linnaeus, Albrecht von Haller, John Hunter, Richard Bright, Thomas Addison, Charles Darwin, Claude Bernard, Florence Nightingale, Rudolf Virchow, Louis Pasteur, Joseph Lister, and Wilhelm Conrad Roentgen.

The 1980 edition contained 1,196 entries and reproductions of 97 notable illustrations selected from the listed books. The third edition contains 2,343 entries and over 250 illustrations of which 40 are in color.

The arrangement of the catalogue is chronological by year of birth of the authors whose works are described. Each entry includes a complete bibliographical description of the work, and nearly all entries are followed by a brief annotation with information about the author, details about the work that reveal its particular importance in the development of medicine or other healing arts, and references to pertinent descriptions of the work in other major medical catalogues.

Since the entries in the third edition have been completely renumbered, a concordance has been provided to assist readers who may wish to refer from entry numbers in the 1980 edition to those in the third edition. An index of names has also been included.

This edition is thus another milestone in the development of a collection that becomes more fascinating with every work that is added. ■

Richard Eimas
Curator, John Martin Rare Book Room
Hardin Library for the Health Sciences

FORTHCOMING EXHIBITIONS

OUR ENVIRONMENT
Mid-March through mid-April 1992.

THE WORK OF CARROLL COLEMAN, PRINTER AND TEACHER
Mid-April through May of 1992.

THE SHORT STORY IN ENGLISH
June-August 1992

HISPANIC CULTURE AND HERITAGE IN THE UNITED STATES
September-October 1992.

FRIENDS ANNUAL SPEAKER: ANN ZWINGER, WRITER ON NATURE AND ENVIRONMENTAL ISSUES

Ann Zwinger will be the featured speaker at the 28th Annual Friends of the University Libraries event scheduled for Friday, March 13, 1992, at the Iowa Memorial Union. Her presentation will reflect observations she has made over the years on the state of the environment and will provide insights into the career of a nature writer.

A graduate of Wellesley College and Indiana University and recipient of honorary doctorates from Colorado College (1976) and Carleton College (1984), Zwinger is one the more notable ecological essayists of this century.

Her books, of which the 1991 work *Aspen: Blazon of the High Country* is the most recent, have brought her many awards and honors including a National Book Award nomination in 1972 for *Land Above the Trees: A Guide to American Alpine Tundra*, the 1981 Indiana Authors' Day Award for nature and ecology writings, and the John Burroughs Memorial Association Award and Friends of American Writers Award for nonfiction for *Run, River, Run: A Naturalist's Journey Down one of the Great Rivers of the West*. These works will be among those featured in the University Libraries' exhibition "Our Environment."

In her books, Zwinger provides masterful descriptive interpretations of a wide variety of natural environments. Illustrating the texts are her own drawings of plants and wildlife.

Ms. Zwinger's environmental ethic includes not only respect for nature but also a profound sense of its beauty. A reviewer in Sierra magazine noted that she "works after the manner of a point-

Continued on page 8

BEST COPY AVAILABLE

NEW STAFF APPOINTMENTS

Hideyuki Morimoto joined the staff as Japanese studies librarian in the Libraries on 1 November 1991.

Mr. Morimoto received his masters degree in information and library studies from the University of Michigan in 1987, and is currently completing his doctorate in the same program. He also holds a B.A. and an M.A. in letters from International Christian University in Tokyo.

Previously Mr. Morimoto served for two years as the Japanese studies cataloger and area studies specialist at the Arizona State University Libraries in Tempe. He has also worked as Assistant Programs Officer at UNICEF in New York and as a foreign language instructor at Seisoku Gakuin Senior High School in Tokyo.

Mr. Morimoto's strong academic background in library and information science and his practical experience as a Japanese studies librarian make him a welcome addition to the professional staff at the University Libraries. Mr. Morimoto also holds an appointment as adjunct assistant professor in the Department of Asian Languages and Literature, where he will be teaching courses in Japanese bibliography and reference.

Kathryn Rattenborg was appointed Automation Training Librarian in the University of Iowa Libraries on 1 October 1991.

Ms. Rattenborg will have responsibility for training staff in the use of OASIS, will write local OASIS documentation, and will assist in analysis of OASIS system functions and problems.

Ms. Rattenborg received her B.A. in English from Luther College and her M.A. in library and information science from The University of Iowa.

While pursuing her degree at Iowa she worked for the University Libraries, cataloging monographs on RLIN, the Research Libraries Information Network. After graduation Ms. Rattenborg became the head of technical services at Coe College. In this capacity she supervised the Technical Services Department, worked as a cataloger, and undertook a number of automation and data conversion projects.

She subsequently held two temporary positions at the University of Iowa Libraries. As a reference librarian at the Hardin Library for the Health Sciences she provided reference services and supervised student employees. As temporary automation training librarian she conducted staff OASIS training sessions, re-wrote chapters of the *OASIS Training Manual*, and did extensive testing and analysis of the most recent version of the OASIS software.

Peter Xinping Zhou joined the staff of the University Libraries on 8 July 1991 as Chinese studies librarian.

Dr. Zhou was previously at the University of Illinois at Urbana-Champaign, where he earned his Ph. D. in linguistics in 1990 and his M.S. in library and information science in May of 1991. He also holds an M.A. in English language and literature from Wuhan University and a B.A. in English from Anhwei University.

Dr. Zhou brings to the University Libraries a unique blend of subject expertise in the humanities, teaching experience, and proficiency with computers. He has published several articles in the field of linguistics, designed a number of software packages, and taught college-level courses in English language and literature, Chinese literature and culture, and Hinduism.

Besides taking charge of the development and management of the Chinese studies collection, Dr. Zhou will teach courses in Chinese bibliography and reference and in Chinese linguistics for the Department of Asian Languages and Literature, where he holds an appointment as adjunct assistant professor. ■

ZWINGER

Continued from page

illist, presenting scores of brief, seemingly self-contained sketches — colorful little dots of scenes and facts that in clever juxtaposition and in the aggregate suddenly jell as an ecological whole."

A reception will open the exhibition "Our Environment" prior to the Friends dinner and Ms. Zwinger's talk. Anyone interested in nature and environmental issues is most welcome to attend.

Friends members will automatically receive invitations to these events. Others desiring invitations should contact the Library Administrative Offices, the University of Iowa Libraries, Iowa City 52242 (telephone 319/335-5871). ■

Barbara I. Dewey
Director, Administrative and Access Services

The University of Iowa Libraries
Iowa City, Iowa 52242

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Sept. 1992

The University of Iowa Libraries

Information Arcade

BULLETIN

Classroom draws diverse courses

The diversity of subjects being taught in the electronic classroom at the Information Arcade reveals a growing interest among faculty in how state-of-the-art technology can be employed in teaching.

A variety of courses are being held on a regular basis in the electronic classroom, and others are scheduled for occasional use. Six departments are represented so far this semester, ranging from philosophy, political science, African-American world studies and Spanish, to computer science and library and information science. This mixture of academic disciplines

see Classroom, p. 2

Information Guide

Hours:

- •M-Th 9 a.m. to 9 p.m.
- •Fri. 9 a.m. to 5 p.m.
- •Sat. 1 p.m. to 5 p.m.
- •Sun. 1 p.m. to 9 p.m.

Phone: 335-6465

Professor Bob Boynton uses computers to display materials in his Political Communication and Cognition class.

UI community defines Arcade's role

Three years ago staff and faculty at the University of Iowa had a vision—a vision of a campus center where faculty and students from all academic disciplines would have access to cutting-edge technologies, tools which could be used to further the research, public service, and teaching goals of the University.

With a grant of more than $750,000 from the Roy J. Carver Charitable Trust, with the support of the university administration, and with the work of dozens of committees and individuals, that vision has become reality in the Information Arcade. Located in what was formerly the current periodicals section of the Main Library, the Arcade is a state-of-the-art facility in which the best in library and computer resources are brought together.

The name "Arcade" was chosen in order to demystify the technology at the facility and to en-

see Role, p. 3

Classroom, from p. 1

follows one of the goals of the Arcade, which is to attract faculty from every corner of the university to explore the facility and learn about the computer-based resources and support available to them.

The classroom is equipped with a workstation at the head of the room, where the instructor or professor can control the projection of images from four devices: an IBM, a Mac, a VCR and a videodisc player. The classroom also contains 24 Mac workstations for use by students during and outside of class.

While some professors are using the classroom to expand their presentations with video or computer-generated materials, other professors are incorporating software into their courses so that students will use computers either as a means for learning or as the primary tool in their classwork.

Glass allows privacy at push of a button

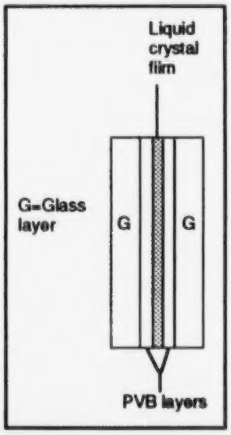
It has the look and feel of thick household glass, but the north wall of the Information Arcade classroom possesses special properties. Called "privacy glass," it can change from clear to cloudy white at the push of a button.

When the glass is clouded, it acts as an translucent screen to block visibility. This eliminates visual distractions as people move around outside the classroom. It is effectively an "instant curtain" that the instructor can draw or pull back in a fraction of a second.

Privacy glass, also known as vision panelling, has been used at a number of places across the country. Some medical facilities use privacy glass because curtains or mechanical blinds tend to collect dust and are difficult to sterilize. Vision panels can also be used as a projection surface for slides and video, as at Walt Disney World in Orlando, FL.

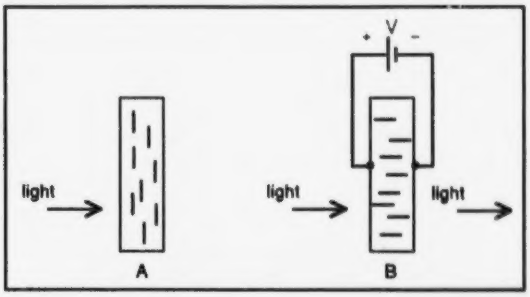
How does privacy glass work? Between two plates of glass lies a film coated with liquid crystal droplets. Normally there is no current running through this film and the droplets are translucent, blocking about 70% of the light. When a voltage is applied, the charged film becomes transparent, allowing light in.

— Jeff Bishop



Privacy glass construction

How liquid crystal film works



Film is opaque to light and appears white (A). When a voltage is applied, the film changes conformation, becoming clear.

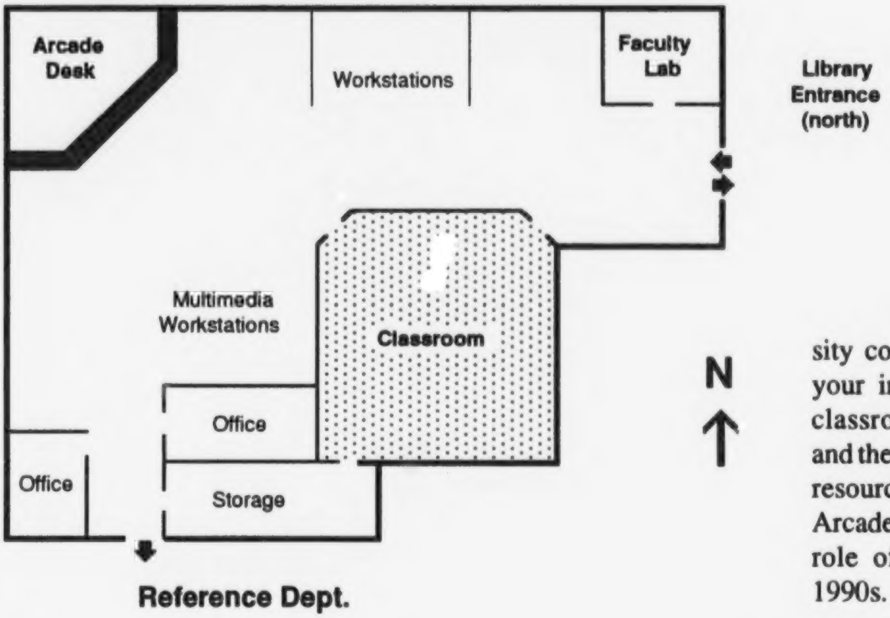
Role, from p. 1

courage members of the university community to come "play" with their ideas. Users of the Arcade, or "Info. Arcadians," will use the Information Stations to hop on the Internet and travel the electronic world in search of research material, or to converse with their colleagues around the globe. Users will bring in information in various forms—audio, video, text—and integrate that information into a compelling collage of words, sounds, and still and motion pictures on the Multimedia Stations. And instructors will bring all these aspects to bear in the state-of-the-art computer classroom.

We have the facility, the equipment, and the staff. What is needed now to meet the Arcade's vision is you—the university community. It will be your innovative use of the classroom, the computers, and the human and electronic resources at the Information Arcade, that will define the role of the Arcade in the 1990s.

—Laurie Dickinson

Map of the Information Arcade



Philosophy professor teaches logic using computers

David Stern's world is not only symbolic, it's electronic. The assistant professor of philosophy is using a software program called Tarksi's World in his course, Introduction to Symbolic Logic.

So far, Stern has been using the classroom in the Information Arcade to display the software, helping his students become familiar with the program and addressing any difficulties they encounter while doing their homework problems. The software also allows Stern to grade those assignments. "I have used logic teaching software in the past, but as it has not been possible to display or use it in the classroom, this has led to problems integrating teaching and homework time," Stern said. "The Arcade allows us to solve that."

> "Like any new gadget, it holds out the promise of making all sorts of things possible that weren't possible before..."
>
> — David Stern
> Assistant Professor of philosophy

Stern has additional plans for using the Arcade

see Stern, p. 4

Stern, from p. 3

classroom technology. "Once the network is fully in place, I hope to be able to have students use the course software in class, display their homework solutions to the class and generally make more interactive use of the classroom than would otherwise be possible," he said.

In general, the role of computer technology in philosophy has been limited to word processing, Stern said. "Its potential in areas such as teaching logic or working with electronic text is just beginning to be explored. Like any new gadget, it holds out the promise of making all sorts of things possible that weren't possible before, but it will take considerable effort to find out what actually works and what doesn't."

Stern said he sees one drawback to allowing technology a greater role in teaching. "Like any gadget, it can provide a distraction from actually getting one's real business done," he said.

— Jim Duncan

The University Libraries
Campus
Information
Services
Network

The University of Iowa
University Libraries
Iowa City, IA 52242

General Job Description for Graduate Assistants in Information Arcade

(twenty hours/week)

In general, the Graduate Assistants will serve as the primary on-call assistants in the Information Arcade. They will be expected to have a general knowledge of all of the electronic resources such as software, databases and development tools available in the Arcade, on the Internet and on the campus network. They will be required to know how to use the major software tools available in the Arcade and will have a general knowledge of the instructional software available for use by Arcade users. In addition, they will be required to be knowledgeable about research methodology and how to approach the integration of traditional and electronic library and information resource.

Typical daily tasks will include providing on-demand assistance to users both at the Information Service Desk and at the workstations throughout the Arcade, writing tutorials on the use of Arcade resources, teaching mini courses to small groups of users on the use of online databases, development and authoring tools, assisting faculty members in learning the capabilities of the Arcade, assisting faculty teaching in the electronic classroom in planning assignments related to the Arcade, supervising undergraduate assistants during hours when other full time staff are not present.

Additionally, each graduate assistant will be required to complete a project each term as assigned by the Arcade Manager.

The graduate assistants will also provide backup for the undergraduate assistants and perform those tasks as needed. These tasks will include answering the phone, checking electronic resources in and out of the Information Service Desk, coordinate and schedule, if necessary, the use of equipment and resources in the Arcade, back up critical files as needed, scan the network for viruses and take necessary measures to keep the Arcade virus-free, maintain printers and perform all of the tasks described in the Lab Monitors' job description.

Requirements:

Demonstrated effective communication skills in individual and group settings and in dealing with highly technical information as well as broad range of information sources; ability to understand and evaluate basic research problems; depth of experience with information technology; ability to organize personal time, manage projects and work effectively in a team environment; ability to meet deadlines and adhere to schedules.

INFORMATION ARCADE
Proposed Courses/Projects
1992/92

A great deal of interest has already been generated among the faculty with new proposals arriving on a weekly basis. Some courses would be developed elsewhere, such as at Second Look Computing, the Instructional Computing Unit at Weeg, or CONDUIT and some would be developed in the Arcade. All would use the classroom in the Arcade for teaching and demonstration.

David Stern — **Department of Philosophy**

Course using "Tarski's World" on the MacIntosh

Bill Decker — **Computer Science**

Survey of Computing: a large multi-section service course available to undergraduates wanting a first exposure to computing.

Don Eppley — **Computer Science**

Problem Solving and Computing: a proposed General Education Requirement course satisfying the Quantitative and Formal Reasoning requirement in Liberal Arts.

Don Alton — **Computer Science**

Software Engineering: a proposed software engineering track of courses at the master's level.

Bob Boynton — **Political Science**

An undergraduate course in political communication using multi-media.

David Martin — **Business Librarian**

A short course on the use of Dow Jones News Retrieval, training materials for the use of Compact Disclosure, a course on the use of online databases in business.

John F. Huntley — **Department of English**

A course on Shakespeare's *King Henry V* using multi-media.

Janice Simmons-Welburn **University Libraries**
and Marsh Forys **Reference Department**

A course on the Electronic Library, a course called "Getting the Most From OASIS (The Libraries' online catalog), and Internet Workshops.

William Welburn Social Science Coordinator, University Libraries

A Research Seminar on Electronic Social Sciences Information.

Bill Donahue **College of Nursing**

A project to utilize the META-1 Thesaurus from the National Library of Medicine in the College's Nursing Intervention Classification Project. A related project would be to interface the Thesaurus with he proposed local MedLine system.

Brooks Landon **Department of English**

A multi-media course called "the Silver City", based on the Chicago World's Fair. The course would be developed at Second Look Computing and taught in the Arcade's electronic classroom.

Peter Trotter **CONDUIT**

Demonstration of all CONDUIT software. Use of the classroom by English as a Second Language (ESL) faculty utilizing CONDUIT-developed software.

Information Arcade Advisory Council

Chair, Larry Woods, Director Information Systems and Technology
University Libraries

Faculty

Bob Boynton	Political Science
George Cain	Biology
Jim Rice	Library Science
Martha Craft	Nursing
Brooks Landon	English

Libraries

Janice Simmons-Welburn	Reference
David Curry	Sciences
Tim Shipe	Humanities
William Welburn	Social Science
Doug Lonowski	Instructional Design

Academic Computing Services

Joan Huntley	Weeg - Second Look Computing
Marilyn Drury	Weeg - PCSC
Chris Pruess	Weeg - Manager, User Support Center
Judy Thayer	Weeg - Educational Media

Other

Cordell Jeppsen	University Video Center

Students (to be appointed)

The initial appointment will be for the length of the Carver Grant to give continuity to the group. At the end of the grant period (April 1994), the role and makeup of the Advisory Council will be reviewed and a recommendation will be made for an ongoing advisory mechanism. The following Task Forces will be appointed from among the Advisory Council and may have additional members as appropriate:

Databases Task Force
Will develop criteria for database selection and access mechanism and make recommendations to the Advisory Council.

Instructional Software Task Force
Will develop criteria for the selection of instructional software and subject discipline-specific programs to be purchased and make recommendations to the Advisory Council.

Tool Software Task Force
Will develop criteria for the selection of developmental and tool software to be purchased and make recommendations to the Advisory Council.

Operations Task Force
Will make recommendations to the Advisory Council concerning staffing, the newsletter, hours of operation, and assist in budget preparation.

Additionally, an Information Arcade Technical Advisory Committee will review databases and software recommended by the Task Forces and recommend to the Information Arcade Advisory Council the appropriate hardware and network to support the applications.

INFORMATION ARCADE

TASK FORCE ASSIGNMENTS

1. Database Task Force

*David Curry, Chair	Sciences Coord/LIB
*Tim Shipe	Humanities Coord/LIB
*Chris Pruess	WEEG Computer Center
*William Welburn	Soc. Sciences Coord/LIB
*Marilyn Drury	WEEG Computer Center/PCC
Jim Julich	Reference-Database Searching/LIB
Nick Johnson	College of Law
Carolyn Kohler	Govt Documents/LIB
Patty Vaught	Humanities/LIB
Chris Africa	Humanities/LIB
Sandy Ballasch	Reference/LIB

2. Instructional Software Task Force

*Bob Boynton, Chair	Political Science
*George Cain	Biology
*Jim Rice	Lib/Information Science
Don McLain	WEEG Computer Center
Marsha Forys	Reference-User Education/LIB
Charlene Lehman	Serials Dept/LIB

3. Tool Software Task Force

*Joan Huntley, Chair	WEEG/Second Look Computing
*Brooks Landon	English
*Judy Thayer	WEEG/Education Media Coord
*Daniel Lind	University Video Center
John Forys	Engineering Library
John Nelson	Political Science
Pat Emerson	Cataloging Dept/LIB
Christine Lee	Math/LIB

4. Operations Task Force

*Doug Lonowski, Chair	Information Systems/LIB
*Marsha Craft	Nursing
*Janice Simmons-Welburn	Reference Coordinator/LIB
Julie Tallman	Lib/Information Science
Diana Harris	Business/Computing Services
Steve Wicklehaus	Cataloging/Soc. Sciences
Phil Potter	WEEG Computing Center/OSG

*Designates Advisory Council Member

5. Technical Advisory Committee

Bill Sayre, Chair	Administrative Office/LIB
Mike Noth	WEEG Computer Center
Doug Eltoff	Engineering/ICAEN
Eric Rumsey	Health Sciences Library
Tim Dawson	WEEG/Second Look Computing
*Doug Lonowski	Information Systems/LIB

Information Arcade Advisory Council

Charge

Rev. 4/21/92

During the start-up of the Information Arcade the Council shall:

- Advise on the programs and policies of the Arcade and plan future program directions.
- Advise on the acquisition of initial software and information product purchases, graduate student and faculty development projects, and the usage of the electronic classroom.
- Work with the Director, Information Systems and Technology, and the Arcade manager.
- Recommend a name for the Arcade.
- Develop a staffing plan for the Arcade and identify staff responsibilities.
- Establish a regular newsletter.
- Develop a five year plan for the Arcade.

After the start-up phase of the Arcade, the role of the Council shall be advisory in nature. The Council shall help identify new Arcade projects and programmatic directions. Recommendations of the Council shall be made to the Arcade manager, the Director of Information Systems and Technology, and the Arcade Steering Committee.

dl

Information Arcade
Advisory Council

Database Task Force
Charge

Rev. 4/21/92

The Database Task Force shall:

- Establish criteria for the evaluation of databases for possible use in the Arcade
- Establish criteria for determining the access systems to be used for selected databases (i.e. CD-ROM permanent work station, user-mounted CD-ROM station, online-LAN, online-MDAS) and make recommendations.
- Evaluate a wide variety of databases currently available on CD-ROM and online.
- Coordinate database purchases with subject area policies within the Libraries' general collection development program.
- Make a prioritized recommendation for purchase of/subscription to databases and the access systems to be used.
- Estimate the Arcade's initial database expenses (purchase, installation, or other one-time fees).
- Estimate the Arcade's recurring database expenses (yearly subscription rates, upgrades, new subscriptions, etc.).

The recommendations of this task force will be made to the Information Arcade Advisory Council.

dl

Information Arcade Advisory Council

Instructional Software Task Force Charge

Rev. 4/21/92

The Instructional Software Task Force shall:

- Establish criteria for the evaluation of instructional software for possible use in the Arcade.
- Establish purchasing and upgrade policies for instructional software.
- Evaluate a wide variety of instructional software currently available based on the criteria for evaluation.
- Coordinate instructional software purchases with academic department needs.
- Coordinate instructional software purchases with subject area policies within the Libraries' general collection development program.
- Make a prioritized recommendation of instructional software programs for purchase.
- Estimate the Arcade's initial instructional software expenses to establish the software library.
- Estimate the Arcade's recurring instructional software expenses (i.e. new software & upgrades).
- Establish criteria for the inclusion/selection of shareware/freeware.

The recommendations of this task force will be made to the Information Arcade Advisory Council.

dl

Information Arcade Advisory Council

Tool Software Task Force Charge

Rev. 4/21/92

The Tool Software Task Force shall:

- Establish criteria for the evaluation of tool software (graphing, CAD, WP, SS, DBMS, authoring tools, etc.) for possible use in the Arcade.
- Establish purchasing and upgrade policies for tool software.
- Evaluate a wide variety of tool software currently available based on the criteria for evaluation.
- Coordinate tool software purchases with academic department needs.
- Make a prioritized recommendation of tool software programs for purchase.
- Estimate the Arcade's initial tool software expenses to establish the software library.
- Estimate the Arcade's recurring tool software expenses (i.e. new software & upgrades).
- Establish criteria for the inclusion/selection of shareware/freeware.

The recommendations of this task force will be made to the Information Arcade Advisory Council.

dl

Information Arcade Advisory Council

Operations Task Force Charge

Rev. 4/21/92

The Operations Task Force shall establish policies and guidelines for the general operation of the Arcade for the following areas:

- Staffing
- Staff Positions and position descriptions
- Staff training (instruction, policies handbook, operations manual)
- Open hours
- Software checkout
- Use of student's personal software
- Copyright compliance
- Software maintenance and upgrades
- Software support
- New hardware purchases
- Equipment maintenance
- Hardware and software inventory
- Hardware and software security
- Information Arcade Newsletter
- Budget

The recommendations of this task force will be made to the Information Arcade Advisory Council.

dl

Information Arcade
Technical Advisory Committee

Charge

Rev. 4/21/92

The Technical Advisory Committee will review the technical requirements of the databases and software to be purchased and recommend the appropriate hardware and network(s) to support such applications. They will continue to watch for new technologies and make recommendations regarding purchases for the Arcade.

Recommendations shall be made for the following areas:

- Computer hardware
- Networking hardware
- Networking software
- Gateways/access to other networks
- Peripherals (printers, CD-ROM drives, videodisc/CD-I players, video projector, back-up devices, imaging equipment, etc.)
- CD-ROM networking
- Equipment depreciation and replacement

This committee will take its direction from and make its recommendations to the Information Arcade Advisory Council.

dl

Kent State University
(OhioLINK)

OLIS
Ohio Library & Information System

Connecting People, Libraries, & Information for Ohio's Future

The Ohio Board of Regents

Overview

The twenty-first Century will come to Ohio's citizens nine years early in 1991 with the advent of a statewide library and information system that will be the most powerful yet to be developed. To be known as the Ohio Library and Information System (OLIS), the new system will offer the most effective tool yet created for locating and retrieving printed and electronic information. Through the use of leading-edge computer technologies, Ohio's major university libraries will appear to users as a single resource comprising more than 19 million volumes. OLIS will also provide unparalleled access to the rapidly increasing array of information sources available in electronic formats.

OLIS will play a significant role in Ohio's economic and educational development. Ohio is home to a premier group of international providers of electronic information; the addition of OLIS will serve to reinforce and extend Ohio's world leadership as an "information state." As today's severe shortage of trained scientists and engineers becomes more acute in the mid 1990s, OLIS will be a potent recruiting tool for Ohio's universities and research industry. Research and access to information are vital to the economy of the future; OLIS will provide quick and comprehensive access to the latest information that researchers, both in universities and in business, will require if they are to remain competitive.

OLIS will operate on several levels.

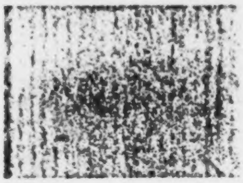
- Centrally, OLIS will be a computer system that includes a software "search engine" capable of organizing, sorting, and retrieving vast quantities of information stored within the state and around the world. Ohio's high-speed supercomputer network, OARnet, will link this central computer to university computers.
- The campus systems will support local online library catalogs and related services, and provide sophisticated computer workstations designed to assist both beginning and advanced researchers in navigating the expanding information universe. Faculty and students from all OLIS universities will have direct and almost immediate access to materials held by the state's principal academic libraries. Most printed documents will be delivered to campus researchers within days; smaller documents will be received in hours by telefacsimile; and materials in electronic formats will be transmitted in minutes.
- Beyond the campuses, researchers in business, industry, and government, as well as all Ohioans, will have easy access to the system's state-of-the-art information searching software.

OLIS will provide the best of both the technological and organizational worlds—the flexibility and responsiveness of a decentralized system and the highly efficient use of resources provided by a massive central unit. OLIS will bring economies of scale to such sharable resources as computer storage and high volume access to national information centers. Yet, even though the total system available to users will be of unsurpassed dimensions, local control will be maximized. Campuses will be able to tailor a wide range of capabilities to their particular needs and will have the opportunity to focus on areas of greatest local importance.

Efficiency and synergy are key words for OLIS. The system will be exceptionally efficient, both in managing existing resources to increase quality, and in coping with the complex and rapidly changing demands of the future. At the same time, OLIS will promote higher levels of cooperation among Ohio's universities and between higher education and industry.

Why does this magnificent applied science which saves work and makes life easier bring us so little happiness? The simple answer runs: Because we have not yet learned to make sensible use of it.

—Albert Einstein



Introduction

The Information Problem

The ways in which our society finds and uses information are changing dramatically. A great deal of published material is now appearing in electronic formats, either as computer databases of bewildering variety and purpose or, at an accelerating pace, as "full text" databases that replace the printed journal article or book entirely. The volume of traditional published library materials—books and journals—is also expanding rapidly. But the cost of acquiring, cataloging, and storing these items is increasing at a rate that outstrips the resources of both public and private research universities. A single library, academic or public, can no longer expect to have a comprehensive collection of materials even in highly specialized areas.

People who need regular access to information—students, faculty, and researchers in business, industry, and government—cannot keep up with the ever-increasing volume of published material and with the changes in the way this material is transmitted. Even experts in specialized areas are daunted by the challenge of identifying the sources they need and mastering the complex and varying formats in which those sources appear. People investigating a field that is new to them—students or faculty conducting interdisciplinary research, for example—are often unable to cope without the assistance of scarce specialists.

Finally, all users of information are plagued by the difficulty of securing rapid access to the material they need.

How will OLIS actually make a difference in the everyday lives of Ohioans? Some brief examples of the ways in which people will benefit from the system are included here and on the following pages.

A physician in a rural hospital clinic affiliated with one of the State's colleges of medicine is treating a patient who has just undergone surgery for breast cancer. The patient has been taking lithium to control depression, and her physician would like to continue her cancer treatment with the drug tamoxifen but wants to verify that there will be no harmful interaction between the two drugs.

Using the campus network to dial into OLIS, he accesses a medical database such as MEDLINE. A search query "tamoxifen and lithium" locates two articles. One is in a journal available on the computer in full-text format. OLIS quickly retrieves this article, which discusses the possible side effects of both drugs but not possible interactions. The physician requests that the other article be sent to him by telefacsimile. It reaches him the next morning and affirms that there is no significant interaction between the two drugs.

The OLIS Solution

The Ohio Library and Information System (OLIS) will be the most powerful statewide library and information system in the nation and will play a major part in improving the quality of education and research in Ohio. OLIS will respond effectively to all of the problems posed by the emerging "information society," connecting people, libraries, and information in a network of unparalleled sophistication and efficiency.

- OLIS will link university libraries throughout the State so that they will appear to the user as a single resource of some 19 million volumes. Students, faculty, and other researchers will have direct access to a collection of published knowledge far larger than that otherwise available.
- OLIS will be a gateway to the rapidly expanding world of information stored in electronic formats. Users will gain access to these new sources through the same computers they use for online library catalogs.
- OLIS will use advanced software and hardware technology to provide researchers with a comprehensive and intelligent guide to the effective use of library and information resources.
- OLIS will recognize that the need to know is immediate. Researchers who want to borrow materials from other OLIS libraries will learn the status of those materials within minutes. They will receive loaned books and similar materials within several days; journal articles and other short texts sent by telefacsimile will be received within 24 hours.
- OLIS will provide for more cost-effective use of existing resources.
  - Because most materials held by OLIS libraries will be available to all other participating libraries within a few days, faculty, librarians, and administrators will have the option of managing the purchase of new books and journals in a significantly more efficient manner. Universities will be able to rely on others in the system for items of peripheral interest at their institution and will therefore be able to focus available funds on materials of particular importance to their core programs.
  - Subscriptions for computer-based information services can be negotiated on a statewide basis rather than at an institutional level.
  - Ohio's public and principal private research universities now purchase expensive software maintenance agreements and provide highly skilled staff to support several different library computer systems from different vendors. OLIS will bring economies of scale to both.
- OLIS will be important to Ohio's economy both directly and indirectly. Ohio is often called an information state because it is home to a sizable number of concerns that provide information in electronic formats—among them Chemical Abstracts, Compuserve, Mead Data General, and OCLC. OLIS will be a valuable addition to this dynamic group. As an information resource for all Ohioans, OLIS will also be of enormous benefit to existing and future research-based manufacturing corporations and to the growing services sector. Finally, by attracting outstanding students and faculty and helping them win research grants and contracts, OLIS will significantly strengthen higher education in Ohio. The rapid transfer of research knowledge to the classroom environment will help to attract and retain those leading elements of business and industry that rely upon an educated workforce.

How Is OLIS Different From Existing Systems?

Q There are electronic union catalogs that represent the collections of a number of libraries—examples are available through OCLC and the Research Library Information Network (RLIN). But they are complex systems designed for library professionals and are cumbersome, even intimidating, to the ordinary library user. Will OLIS be different?

A Yes, OLIS will be designed to be readily accessible to every user and will accommodate people at all levels of skill.

Q Current electronic union catalogs describe what a library owns, but do not indicate whether an item is available. Users must first request an interlibrary loan and then wait at least two to three weeks to learn whether the material can actually be borrowed. And delivery of requests takes even longer. Will OLIS be more helpful?

A OLIS will instantly advise users about the availability of material and will provide delivery of an item within several days. If the material is in electronic form, delivery can take place within minutes.

Q Powerful specialized databases—such as the MEDLINE catalog of medical publications and the SCISEARCH catalog of scientific publications—are tremendously valuable to researchers, students, and scholars. But many of them are expensive to use and most require that users learn a new "protocol," or search language. How will OLIS be an improvement?

A By contracting cooperatively for access to a number of the databases users most want, OLIS will be able to reduce substantially the cost of database access for OLIS participants. Through its specially developed software, OLIS will allow users to search nearly all its databases with only one protocol.

Q Some statewide library systems already exist—in California, Florida, and Colorado, for example—but most provide only limited services. Illinois has a sophisticated system that provides effective service in catalog access, circulation, and delivery of library materials. How will OLIS be different?

A OLIS will build on the experience of others, but it will also take advantage of the most recent advances in computer technology. As a consequence, OLIS will provide more local options for use of the system, and will have greater power and flexibility in integrating new electronic information sources.

The Structure of OLIS

OLIS refers both to a library and information system and to the computer hardware and software designed to support that system. The hardware and software will be located at a central site and at each member library. The software will perform different operations at the central and campus sites, but at both locations it will serve as a search "engine," organizing, sorting, and retrieving information. The communications network for OLIS—in other words, the highways on which the information will travel around the State—will be provided by the Ohio Academic Resources Network (OARnet). OARnet will use the communication links between computers at the member libraries and the central OLIS site to transfer data between institutions. The primary information resource available on OLIS will be the central (or union) catalog, which contains information on all books and journals held by participating libraries.

Participation in OLIS

Access to the OLIS union catalog will be completely open and unrestricted. Anyone will be able to search OLIS to identify and locate materials held by OLIS libraries. Users affiliated with these libraries will also be able to initiate online requests for document delivery. Those not affiliated with a participating library can identify, locate, and request materials through interlibrary loan at their own library.

It is important to distinguish between "access" to and "use" of OLIS as these terms are used in reference to the system. "Access" to the OLIS union catalog will be available to all Ohioans through campus computer workstations and terminals and through dial-in access from personal computers equipped with standardized OLIS software. Comprehensive "use" of OLIS, including borrowing and document delivery, will begin with the largest campus libraries. Because of the need to develop the union catalog, which will be the primary database for the system, the first phase will include only the university libraries. Subsequent phases will include interested two-year and independent colleges. The architecture of OLIS is open and permits the addition of new members at various levels of participation without restructuring.

What OLIS Does

The description of OLIS that follows provides additional detail about how it functions as an information, library, and computer system. Its design combines innovative information management for researchers with an efficient library system. The ways in which OLIS will benefit Ohio's educational and economic future are discussed at the conclusion of this report.

OLIS as a Link

The central function of OLIS will be to provide access to catalog records and circulation information for books and journals held by OLIS libraries. A search for a particular book or volume/issue of a journal will begin with a query to the user's campus library system. If the material is not available locally, the computer will transmit the request to the OLIS Central system to see if it can be located in the union catalog.

OLIS is designed to help users get needed information as quickly as possible. If the system can locate an available copy of a desired item, authorized users can request that the item be delivered to their campus library. If the item in question is a journal article, the user will be asked to identify the specific articles needed and the format desired—photocopy, FAX, or digitized copy. Digitized copies will then be transmitted directly to a computer workstation via the Ohio Academic Resources Network. Books and article photocopies will be delivered by van within several days. Facsimile transmission to the user's campus can take place within hours.

OLIS as a Gateway

OLIS will have a large number of key databases available in electronic format. Examples of the kinds of databases that may be available include PsycINFO, MEDLINE, McGraw Encyclopedia of Science and Technology and Dun's Market Identifiers. The user will be able to search the system's principal databases with the same techniques employed for searching the OLIS catalog. Some databases will be stored and maintained on OLIS Central, the computer that coordinates the communications between member libraries. Others may be located at campus OLIS sites. Some databases may be purchased or made available through commercial or government distribution; and still others may be created at a campus library—e.g., an index of manuscripts held in a special collections department of a campus library.

A University chemist will be working with E.P.I.C., one of the Edison Program's "technology centers" that link corporations, universities, and federal laboratories in Ohio. Although her primary research interests have been in polymer chemistry, she now expects to become more involved in polymer manufacturing.

She visits the university library to review the latest information on microcomputer applications in polymer manufacturing. Working with the librarian, she identifies several databases, develops a search protocol on the topic, and conducts a search on the spot. She also orders the search to be repeated monthly to find newly-published articles and books or conference proceedings that are added to the library's collection. She plans to download each month's search results to her microcomputer, creating a working bibliography from which she can order specific materials to be sent to her office.

Like bibliographic databases, full-text files will be stored at various sites, but OLIS Central will either hold or provide gateway access to a large percentage of them. As electronic publishing becomes more widespread, OLIS libraries are likely to buy and create full-text files to satisfy the specialized scholarly and research interests of their faculties and the instructional needs of their students. Thus, full-text electronic versions of certain periodicals in law, medicine, public administration, artificial intelligence, or robotics, for example, might be acquired and maintained by campus libraries to meet special campus needs on a continuing basis. These specialized databases would then also be available generally to participating OLIS libraries.

The procedures for searching full-text databases and retrieving information from them will be consistent with those for bibliographic records, but the user will require special numerical and graphical analysis tools for manipulating some non-bibliographic databases. Further, some future databases may require sophisticated tools for dealing with information stored in other formats; OLIS may have, for example, compressed digital audio for works of music or speeches, and compressed digital video for an art museum collection.

OLIS as a Guide

Whether entered through a library terminal, a microcomputer, or a workstation, OLIS will be very easy to use. It will rely upon a simple, robust, and powerful software program designed to encourage people to use the services provided by the system. The layout and organization of screens and menus will be clear, logical, and intuitive. The OLIS software will also be designed to interact with the most powerful, sophisticated, and advanced features of state-of-the-art microcomputers and workstations. The OLIS software, which provides users with a sophisticated searching tool, will be available to all users; however, the capacity and sophistication of the computer will determine the level and the actual features of the OLIS system available to the user.

A University collection development librarian has received a purchase recommendation for *The History of Costume*, a new multivolume slide set that costs $5,000. Although her university has a strong undergraduate program in history, costume history is peripheral to the interests of most of the faculty. The librarian questions whether the expenditure would be justified by local use. Before making a final decision, the librarian searches the catalog and acquisition records in OLIS; no other library owns or has ordered the set. She then checks the Online Conspectus (an OLIS database that highlights collection strengths of OLIS libraries) to identify the institutions with strong collections in costume history. Contacting her colleagues at these institutions via OLIS's electronic mail service, she learns that another university has plans to purchase the set. Since OLIS will provide access to the material, she decides not to buy the set. She also notifies the recommendation source and other potential users of the material's future availability through OLIS.

- Terminals, like those now in most libraries, will provide a choice of menu or command-driven approaches to a search of both the union catalog and OLIS-mounted databases. An online "help" program will offer detailed information about specific selections or commands.
- In addition to the searching and help capabilities available through terminals, microcomputers offer the option of using custom software (available from OLIS) that allows the use of a mouse or other pointing device-driven interfaces. Microcomputer users will be able to employ the power of their local systems to run OLIS in a "window" while operating other software, and save the results of their search directly to programs such as a database or a word processing program.
- In addition to all of the other capabilities, the OLIS-W software will use the resources of more powerful microcomputers (usually called workstations) to assist researchers in designing effective and efficient searches. OLIS-W will also permit the development of specialized sub programs and will allow users to create interfaces which complement their styles of work.

Microcomputers and workstations will be able to connect to the system through local area networks or through remote (dial-up) connections.

Users can begin by selecting any of three services on the OLIS system. The options available will be determined by the type of machine used to enter the system.

Help

OLIS will be designed so that both the average user with little background in online computer searching and the expert user will be able to make use of the same system. The average user will be encouraged to become more skilled, while the expert user with advanced software and hardware will be able to make immediate use of the more sophisticated strategies OLIS offers. OLIS will provide a simple tutorial, or help screens, to answer questions and solve problems.

Search

The OLIS search protocols will enable all users to identify information in both the campus library database and the OLIS union catalog. Using the same search strategy, the OLIS protocols will query integrated campus and centrally-mounted databases.

With the OLIS-W software, the user will be able to adapt the search protocols to query specialized databases. The system will thus be an intelligent partner for the researcher, suggesting other search strategies, relevant databases, and search terms, but it will also enable researchers to "browse" through its contents just as they might browse through the shelves in a library.

In addition, OLIS-W will recognize that different users have different cognitive styles when working on computers. Some prefer access through direct commands, while others prefer access through menus. Users may also want search results delivered in various formats. With the advanced OLIS software, users will be able to organize search results into various scholarly and research formats or sort the results into major categories. OLIS will also have the ability to deliver search results in sound, video display, datafiles, or hard copy output. The software will be designed so that individual users can tailor it to suit their own needs and preferences.

A geoscientist needs to consult the most current information on the impact of resource exploitation on global climatic change in order to complete a grant proposal to the National Science Foundation.

Working in his lab at the university, he uses OLIS as a gateway to a number of external databases, including NASA's STAR, the Life Sciences Collection, Environmental Fate, and GeoAbs. He transfers the most pertinent abstracts from these databases onto his personal computer.

As his proposal takes shape, he decides that several maps would help illustrate the project. Through OLIS, he reviews the catalog records of the map collections in OLIS libraries and requests copies of three separate maps from three different libraries.

Gateways to External Information Providers

The gateways will provide a simple method for users to reach databases not mounted on OLIS. Users may have to learn the query language and search protocols of different external information providers that have not been integrated into the OLIS query language, but the methods used to reach those databases through OLIS will be standardized.

OLIS as a Library System

The OLIS system architecture will be highly decentralized. Each participating campus will have its own library systems that will be connected to the others via a centrally-located system (OLIS Central) equipped with a powerful search engine. OLIS Central will manage the union catalog of bibliographic records collectively maintained by the campus libraries. OLIS Central will also route requests, loan transactions, messages, etc., to participating campus systems, retrieve detailed holdings and availability information from those campus systems, and transmit this information from one campus to another.

The acquisition of books and other materials is primarily a campus function; however, titles on order will be added to the OLIS Central catalog when the order is placed, and these records can be included in the response to a search.

Like the acquisition of books, the management of serials is a campus function. The OLIS campus system will handle all check-in, claiming, binding, and related functions. When a serial issue is checked in on one OLIS campus system, OLIS Central can immediately include the new issue in its screen display when responding to a search request from any of the participating campus systems.

Each campus will catalog its own new books, journals, audio-visual materials, etc., using bibliographic utilities such as OCLC, and the completed catalog record will then be transmitted to OLIS Central for addition to the union catalog. The cataloging of books new to one campus but already held by another will be accomplished by adding the new campus code to the catalog record in OLIS Central. OLIS Central will then transmit an electronic copy of the record to the online catalog at the campus acquiring the books. For both types of cataloging, OLIS Central will verify that the names and/or subject index terms associated with the book are established and valid. When the names and/or subject terms are determined to be new to a given campus catalog, OLIS Central will transmit to that catalog the cross-references that are associated with these new subject and/or name entries.

The OLIS system will manage all aspects of circulation for the OLIS libraries, including campus library and intra-OLIS circulation, interlibrary loan with non-OLIS libraries, and document delivery (including telefacsimile) between OLIS libraries. The system will thus enhance library service to researchers and students by delivering information to them in all available formats and from all available sources.

Under OLIS, user records will be confidential, but the system will permit libraries to block service to the few who may abuse their OLIS privileges. OLIS will also provide electronic messaging for library staff to communicate with each other and with OLIS users.

A student must write a paper on "how political considerations influenced Dwight D. Eisenhower's military decisions during World War II," but is unsure how to begin.

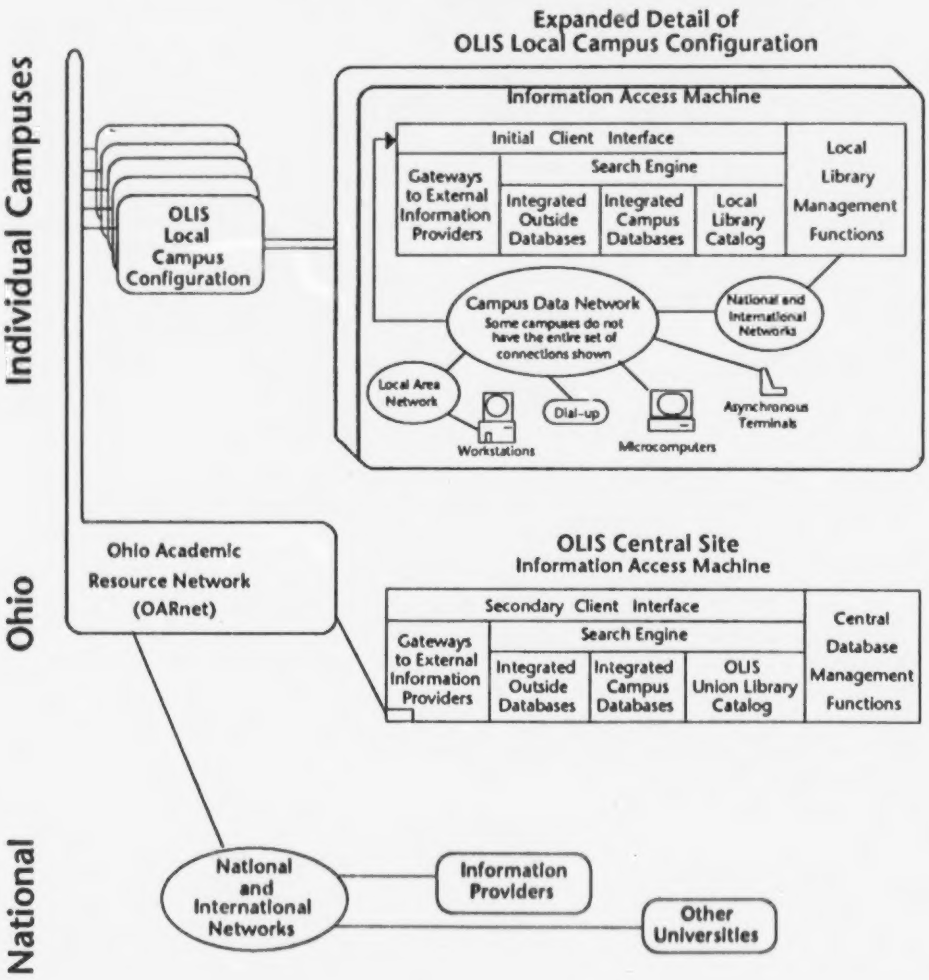
At an OLIS workstation, she keys in "Dwight D. Eisenhower." The screen tells her there are over 2,000 subject references to Eisenhower. It suggests she narrow the topic and offers several options. The student chooses a chronological approach and the workstation screen then displays categories from 1941 to 1960, with over 1,000 entries. She selects 1941 to 1945. OLIS identifies a number of books with chapters covering that time period. She "pages" through the chapter headings of several book titles. Since her paper is due within the week, she orders three books currently available on her own campus and picks them up the next day.

OLIS System Architecture & Strategy

The software search engine at OLIS Central will be capable of organizing, sorting, and retrieving vast amounts of information stored within the state and around the world. The campus library systems that are integrated into OLIS will support their own catalogs and related library functions and maintain sophisticated computer workstations designed to assist both beginning and advanced users in retrieving information.

From a systems perspective, OLIS will provide the best overall technological approach to both a library system and an innovative information system. It will be sufficiently decentralized to be flexible and responsive and sufficiently centralized to provide economies of scale. However, even though the total system available to users and librarians will be of unsurpassed dimensions, each campus will maintain control of its own systems and will retain a significant measure of autonomy. Consequently, if one campus library wants a database

OLIS Networking Overview


Individual Campuses
Ohio
National
Expanded Detail of
OLIS Local Campus Configuration
Information Access Machine
Initial Client Interface
Search Engine
Gateways to External Information Providers
Integrated Outside Databases
Integrated Campus Databases
Local Library Catalog
Local Library Management Functions
OLIS Local Campus Configuration
Campus Data Network
Some campuses do not have the entire set of connections shown
National and International Networks
Local Area Network
Dial-up
Asynchronous Terminals
Workstations
Microcomputers
Ohio Academic Resource Network (OARnet)
OLIS Central Site
Information Access Machine
Secondary Client Interface
Search Engine
Gateways to External Information Providers
Integrated Outside Databases
Integrated Campus Databases
OLIS Union Library Catalog
Central Database Management Functions
National and International Networks
Information Providers
Other Universities

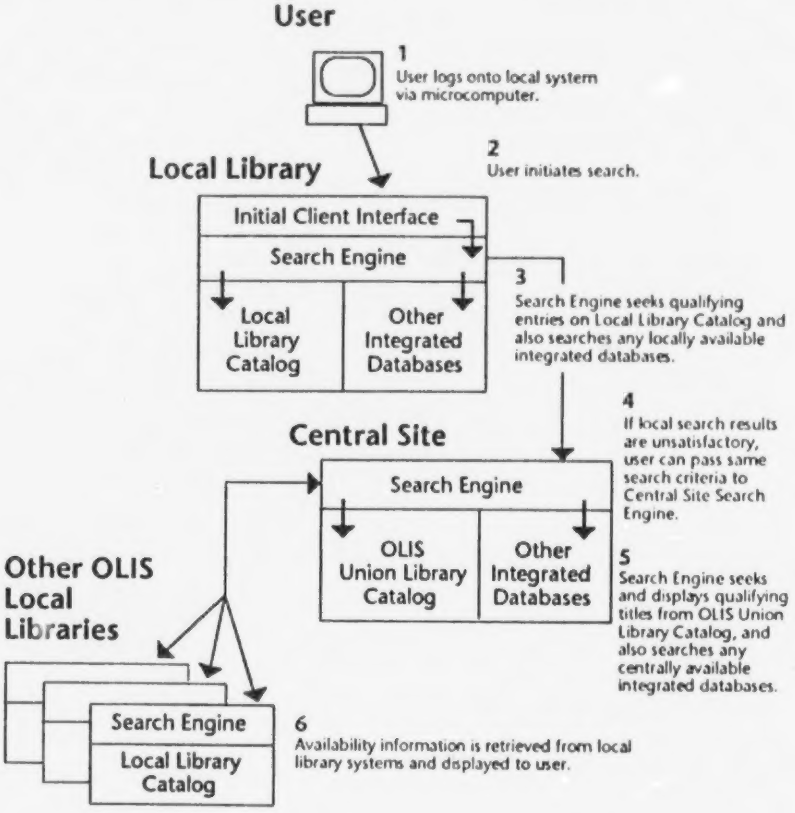
that OLIS at large does not want, that library can purchase and install the database. Similarly, if a centrally available database becomes tremendously popular, copies of it can be installed at several campus sites to minimize communications and processing bottlenecks. Individual institutions will thus be able to tailor a wide range of system capabilities to meet particular campus needs, while the central system will continually improve and enhance the services available to all the participating campuses.

OLIS System and Networking Overview

The "OLIS Networking Overview" on the facing page presents an overall view of the scope of OLIS. The three-tiered network ranges from the individual campuses to OLIS Central and extends into national and international networks. In basic terms, OLIS will be the heart of the library system network in Ohio, providing both access to information and day-to-day library services. In a broader sense, OLIS will be an information utility for the twenty-first century, helping users locate and retrieve data in useful formats from databases anywhere in the networked world.

The "OLIS User Search Example" below illustrates the information flows required for a subject-based search, traced here through a simplified OLIS model. Once a search is completed, users will be able to initiate a loan from one OLIS library to their own campus library.

OLIS User Search Example



1
User logs onto local system via microcomputer.

2
User initiates search.

3
Search Engine seeks qualifying entries on Local Library Catalog and also searches any locally available integrated databases.

4
If local search results are unsatisfactory, user can pass same search criteria to Central Site Search Engine.

5
Search Engine seeks and displays qualifying titles from OLIS Union Library Catalog, and also searches any centrally available integrated databases.

6
Availability information is retrieved from local library systems and displayed to user.

The Benefits of OLIS

Interdisciplinary and Collaborative Research

OLIS will support research and instruction in Ohio in ways other than providing assistance to individual faculty members or students. Some additional dimensions of use can be projected, but others will likely not appear until the system is in the hands of its users. For example, as users voluntarily identify their areas of specialization via keyword interest profiles, OLIS will be able to notify them by electronic mail of new acquisitions in their areas of interest and will even be able to send them new bibliographic entries and full-text files automatically.

In turn, the user keyword profiles could become another OLIS database that would be searched with the same protocols employed for other OLIS files. Graduate students could search the user profile database to identify other graduate students or faculty in Ohio with similar research interests. A company could search the user profile database to identify faculty who have listed interests that suggest that they might be of assistance on a research project. Thus, OLIS will provide information of interest to individual faculty and students, and will also foster collaboration among other researchers and Ohio's businesses and industries.

A law professor is writing a treatise on labor law and wants to review both the legal and social science literature on collective bargaining.

From her home computer, she connects via modem to OLIS and uses it as a gateway to databases such as LEXIS, CIS (an index of publications of the U.S. Congress), and PAIS International (an index of public policy materials in the social sciences). After examining lists of primary and secondary legal sources, she looks for historical material on a key statute.

Keying in a simple request, she orders a number of government documents and monographs that are available from her own campus library and from other OLIS libraries. She will be billed electronically for any direct charges.

Collection Management and Development

OLIS will give Ohio the opportunity to establish a model program to define, collect, and use institutional and statewide circulation and collection data to enhance campus collection planning. The system will also provide a mechanism to implement cooperative collection management among participating libraries. OLIS has the great potential to minimize unnecessary duplication among library collections and to enable each library to focus on specific collection areas.

Business and Industry

OLIS will create an information and technology infrastructure that will support industry and the State's economic development activities. The information needs of industry are as critical as those of faculty and students. Marketing, product development, and production, as well as research and development, require quick and easy access to information. OLIS will help Ohio attract and retain the most innovative businesses and industries by supporting commercial and industrial research and development efforts and by fostering partnerships between researchers in industry and researchers in the State's colleges and universities. OLIS will be good business as well as good educational policy.

Economies of Scale

With its massive central unit OLIS will make highly efficient use of existing resources. The system will also bring economies of scale to sharable resources like computer storage and will enable the State's campus libraries to reap the benefits of high-volume access to national information centers.

Summary

The Ohio Library and Information System is designed to respond effectively and efficiently to the information needs of Ohioans both today and in the future. OLIS will provide a state-of-the-art library system and an innovative information system that can grow with the State's needs into the twenty-first century. By linking the State's campus libraries into a single union catalog, OLIS will increase the impact of Ohio's investment in information resources. Building on the foundation established by the communications network of OARnet, OLIS will also encourage collaborative research not only on college and university campuses but between the business sector and higher education.

Appendices

Background: Planning and Development

Ohio can be considered a pioneer in library automation. The Ohio State University began integrating its campus library systems at an early date. In the 1960s, State funds supported the development of OCLC, then called the Ohio College Library Center. OCLC has since grown into an international organization with a database of more than 20 million entries representing material held at over 10,000 libraries. The private sector in Ohio has also been actively involved in library automation. Organizations and companies like Battelle Laboratories, Mead Data General, OHIONET, Predicasts, and Chemical Abstract Services continue to develop and provide new products and services to the nation's libraries.

OLIS, the latest cooperative venture of the State's university libraries and the Board of Regents, grew out of the Ohio Board of Regents' Library Study Committee recommendations in 1987. The Library Study Committee was appointed by Chancellor William B. Coulter in 1986 to make recommendations on how the State could respond to a rising number of requests for new library facilities. Although the committee's principal focus was on the question of facilities and on library storage, its charge provided for the examination of any option that might improve the quality of academic library services and operations. In addition to a recommendation for the adoption of remote storage, the committee recommended that "the State of Ohio implement as expeditiously as possible a statewide electronic catalog system."

In response to this recommendation, the Board established a Steering Committee representing librarians, faculty, administrators, and computer systems managers from campuses throughout Ohio. The Steering Committee created three task forces to report to it: one on the users' view; one representing the librarians' view; and the final taskforce presenting the system managers' view. Through meetings, public hearings, and conferences, the Steering Committee subsequently prepared and distributed a planning paper (November 1988); an RFI (February 1989) and an RFP (August 1989) for the OLIS system. Separate but integrated projects for workstation hardware and software and for the communications network are under development as well.

An aide to an Ohio legislator notes an increasing number of phone calls about the condition of nursing homes and care of the elderly in the legislator's home district. The aide is asked to prepare a policy report on the subject.

Dialing into OLIS through the State Library, the aide enters the subject "aging" and selects government reports and scholarly books from the OLIS libraries. Still logged onto OLIS, the aide examines databases like Sociological Abstracts, PsycINFO, and PAIS International for recent journal articles. The aide then requests telefacsimile copies of selected articles from sociology, psychology, economics, and political science.

My interest is in the future, because I am going to spend my life there.

—Charles Kettering

Ohio Library and Information System

Major Committee and Taskforce Members

Carol Anderson, Ohio Board of Regents; Thomas Atwood, Youngstown State University; Alison Brown, Ohio Supercomputer Center; Greg Byerly, Kent State University; Carol Jean Blum, Ohio Board of Regents; Barbara Becker–Cantarino, The Ohio State University; Jim Best, Kent State University; Sharon Britton, Wright State University; Scott Bullard, Kent State University; Larry L. Buell, The Ohio State University; E. Frederick Carlisle, Miami University; Susan Cote, Case Western Reserve University; Linda Cain, University of Cincinnati; Robert Cheshier, Cleveland Health Sciences Library; Kathleen Carrick, Case Western Reserve University; Richard M. Cheski, State Library of Ohio; John Chiang, NEOUCOM; William Crowe, The Ohio State University; Karen Clift, Miami University; Marcia Deddens, University of Cincinnati; Richard Dean, Ohio University; Thomas Doctor, Youngstown State University; William T. Dusseau, University of Toledo; Christopher Dalton, Bowling Green State University; Gay Dannelly, The Ohio State University; Walter Edling, Lorain County Community College; Judith Eckelmeyer, Cleveland State University; Barbara Ford–Fisher, Bowling Green State University; C. Taylor Fitchett, University of Cincinnati; Scott Finet, Cleveland State University; Matthew Filipic, Ohio Board of Regents; David Fiste, Case Western Reserve University; Mike Fidler, The Ohio State University; Dave Genaway, Youngstown State University; Edward D. Garten, University of Dayton; Ann Goss, Ohio University; Jeff Gatten, Kent State University; Bonnie Gratch, Bowling Green State University; Thomas Gibney, University of Toledo; George Hodowanec, University of Akron; Thomas Hanley, University of Dayton; Alan Holoch, The Ohio State University; Elaine Hairston, Ohio Board of Regents; David Hendricker, Ohio University; Dale Hague, Miami University; Elizabeth Hoffman–Pinther, Ohio University; Carol Hawks, The Ohio State University; Alan Hogan, University of Toledo; Jack Hibbs, University of Akron; George Hinkle, Ohio University; John Heimaster, The Ohio State University; George T. Johnson, Central State University; Jean Jarosz, NEOUCOM; Johnny W. Jackson, Central State University; Audrey Kidder, Wright State University; Tom Klingler, University of Akron; Jennifer Kuehn, The Ohio State University; Dean Keller, Kent State University; Dell Klinginsmith, Case Western Reserve University; Hwa–Wei Lee, Ohio University; Georgia Lesh–Laurie, Cleveland State University; Susan Logan, The Ohio State University; Jerome A. Levin, Medical College of Ohio; George Lupone, Cleveland State University; Henry Leland, The Ohio State University; Joe Landwehr, University of Cincinnati; Rush Miller, Bowling Green State University; Tess Midkiff, Shawnee State University; Walter Mayhall, Youngstown State University; Kent Mulliner, Ohio University; Ichiko Morita, The Ohio State University; Ken Maccarone, University of Cincinnati; Ray Metz, Case Western Reserve University; Elizabeth McNeer, Wright State University; Kitayun Marre, University of Dayton; J. Carroll Notestine, Ohio Board of Regents; Ronald J. Nimmer, Wright State University; Linda Newman, University of Cincinnati; Phyllis O'Connor, University of Akron; Virginia Peters, Sinclair Community College; Bruce Petryshak, Kent State University; Kenneth Pollack, Wright State University; Joe Phillips, Miami University; Josephine Poda, NEOUCOM; Betsy Plume, Ohio Board of Regents; Dick Pettitt, Miami University; Hannelore Rader, Cleveland State University; Paul Richert, University of Akron; Duane R. Rogers, Ohio Board of Regents; Carolyn Radcliff, Kent State University; Thomas Reid, Ohio University; Joan Repp, Bowling Green State University; Sally Rogers, The Ohio State University; William Rogers, Ohio University; Tim Robson, Case Western Reserve University; Phyllis Self, University of Cincinnati; Judith Sessions, Miami University; William J. Studer, The Ohio State University; Leslie W. Sheridan, University of Toledo; Elizabeth Sawyers, The Ohio State University; Leonard J. Simutis, Miami University; Tim Steiner, Ohio Dept. of Administrative Services; Philip J. Smith, The Ohio State University; Michael Savage, University of Akron; Nancy P. Sanders, Ohio Board of Regents; Gary Stottlemyer, Shawnee State University; Gerald Sanders, Miami University; Donald L. Tolliver, Kent State University; Ritchie D. Thomas, Wright State University; Frank B. Thomas, University of Akron; David Todt, Shawnee State University; Ann Thompson, University of Cincinnati; Monica Unger, NEOUCOM; Roger Verny, University of Cincinnati; Ronald M. Watterson, Medical College of Ohio; Janet Wallin, University of Toledo; E. Garrison Walters, Ohio Board of Regents; Sue Weldon, Wright State University; Mary Ann Walker, University of Dayton; A. Jerome York, University of Cincinnati; Mary Beth Zachary, Bowling Green State University

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Representative John V. Bara, Ex-Officio

William B. Coulter, Chancellor

Published by the Ohio Board of Regents, December 1989.

For more information about OLIS, please contact the Ohio Board of Regents at
3600 State Office Tower, 30 East Broad Street, Columbus, Ohio 43266-0417

Publication designed by educational publishing resources, Cincinnati, Ohio

University of Michigan May 18, 1992 Volume 14, No. 20

Library newsletter

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MAY 2 2 1992

OFFICE OF THE DIRECTOR
UNIVERSITY LIBRARIES

WEEKLY CALENDAR

May 19, 1992 (Tuesday)	Cabinet	10:00 am
May 21, 1992 (Thursday)	TSUH	10:30 am
	CMDC	3:00 pm

(All the above meetings are scheduled in Room 818, Hatcher Graduate Library)

- -

NEW ELECTRONIC SERVICE FOR THE LIBRARY
UM - ULIBRARY

The Library is about to initiate a new electronic service utilizing the University of Minnesota's Gopher software. The projects planned thus far pursue several of the recommendations made last year by the Full Text Committee (members of that group included Margo Crist, Bill Gosling, Wendy Lougee, John Price-Wilkin, Bob Schwarzwalder, and Yvonne Wulff). The exact date of the implementation will be announced soon pending a few last technical details, but we expect that it will occur sometime this month.

Gopher is software that allows a user to navigate network resources and download information. These resources can be files of useful information or connections to other systems available on the Internet. The Gopher system can be accessed from UMNet's WHICH HOST? prompt (with the name UM-LIBRARY), by a Telnet transaction to the server, or as a desktop application for those users with client software and Ethernet connections.

The Gopher software allows a variety of options for structuring resources available via the network. It is sufficiently flexible that it is possible to add additional resources to the existing service (and restructure menus) or link with any additional Gophers which the Library or others might develop. Initial resources planned for ULIBRARY include:

- Links to online catalogs of libraries around the world,
- A newswire service called Clarinet (to be implemented in early summer in conjunction with CAEN),
- Electronic journals (initially "free" titles which are only available in electronic format) including:
    - Current Cites (brief citations to articles about developing technologies in librarianship
    - Bryn Mawr Classical Review
    - PACS-L Review (library related technology news)
    - Psychologuy (covers psychology and related fields)
- Links to other Gophers, including potentially a similar service offered by ITD with campus information resources,
- Social science data, including: 1990 Census data for Michigan counties, townships, and places and U.S. Commerce Department's set of over 700 data files realted to the U.S. economy (e.g., Treasury bill rates, Gross Domestic Product, CPI).

A forum is being planned in the near future to introduce interested Library staff to Gopher and a mailing to faculty is also in the works for this month.

-- Margo Crist --
Assistant Director for Public Services

* * * * * * * * * * * * * * *

University of Michigan Library

New Networked Information Resources

ULibrary Demonstration & Hands On
Tuesday, July 14, 3-4pm
Room 203 Graduate Library
Call 4-1148 to reserve a space.

ULibrary

The University Library will be implementing a software tool, Gopher, developed by the University of Minnesota for navigating and accessing information and systems available via electronic networks. The Library's Gopher system, called "ULibrary", makes these resources easier to find and use, provides a user-friendly interface, and runs on most microcomputers. The Library is providing experimental access to a number of resources (described in this brochure) via ULibrary.

New Library Classroom/Laboratory

A newly created facility will showcase ULibrary and other new electronic resources and technologies and stimulate greater incorporation of these resources into courses. The facility will serve as both instructional and laboratory space, and will feature a networked multi-platform workstation environment (primarily Unix), laser disk and CD-ROM players, as well as various advanced information retrieval products (e.g., Gopher and WAIS) and data collections of interest, many of which are described in this brochure.

For additional information, call 764-9373, or send electronic mail to: ULibrary@um.cc.umich.edu

Accessing ULibrary

1) At the *Which Host?* prompt, type: `um-ulibrary`
For help on getting to a *Which Host?* prompt, call the Computing Resource Center's help line (764-HELP).

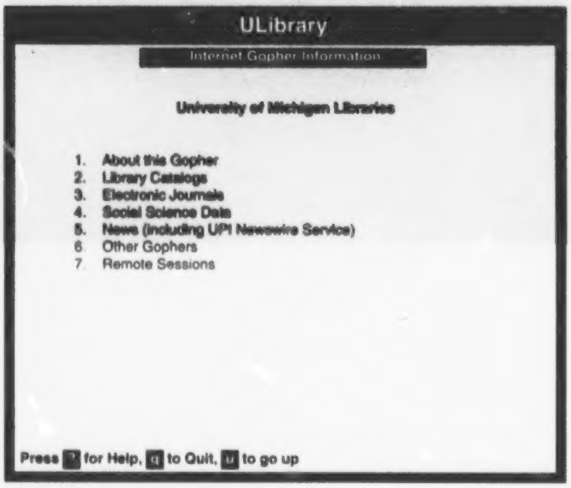
2) At the login prompt, type: `gopher`

3) ULibrary's main menu screen will appear. To move to a menu option, use your keyboard's arrow keys or type the option's number and then the return key.

4) Note that useful commands are displayed on the bottom of each screen.

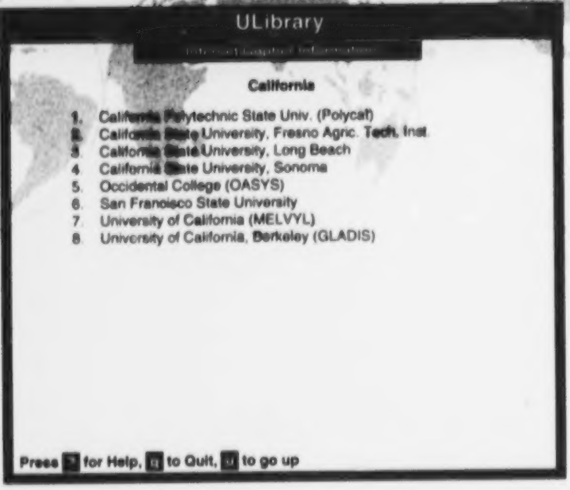
Users who have Ethernet connections may obtain more powerful Gopher client software packages designed to run on their specific platform. Users running Gopher clients can access ULibrary by connecting to: gopher.lib.umich.edu

For more detailed help, refer to the guide *Using ULibrary: The University of Michigan Library's Gopher System* (available in 203 Hatcher North). For further assistance, call 764-9373 or send electronic mail to: ULibrary@um.cc.umich.edu


ULibrary
Internet Gopher Information
University of Michigan Libraries
1. About this Gopher
2. Library Catalogs
3. Electronic Journals
4. Social Science Data
5. News (including UPI Newswire Service)
6. Other Gophers
7. Remote Sessions
Press ? for Help, q to Quit, u to go up

Online Library Catalogs of the World

Allows access to hundreds of catalogs that represent the collections at universities from Michigan to New Zealand. Beneficial resource for research, cataloging, and interlibrary loan.


ULibrary
Internet Gopher Information

California

1. California Polytechnic State Univ. (Polycat)
2. California State University, Fresno Agric. Tech. Inst
3. California State University, Long Beach
4. California State University, Sonoma
5. Occidental College (OASYS)
6. San Francisco State University
7. University of California (MELVYL)
8. University of California, Berkeley (GLADIS)

Press ? for Help, q to Quit, u to go up

Electronic Journals

Provides access to full texts of various electronic journals. Articles can be read on-line, or downloaded to a personal computer. The journals include:

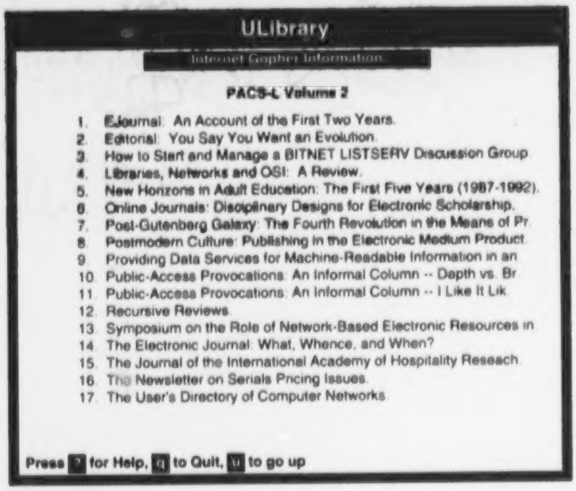
Bryn Mawr Classical Review- a review journal of books on Greek and Latin classics.

Current Cites- brief citations to articles about developing technologies in the field of librarianship.

PACS-L Review- covers computers and other technologies used by patrons of libraries and information centers.

Postmodern Culture- a journal of interdisciplinary studies, including analytical essays and reviews, video scripts, and other new literary forms.

Psycoloquy- covers psychology and its related fields, such as cognitive science, neuroscience, behavioral biology, linguistics, and philosophy.

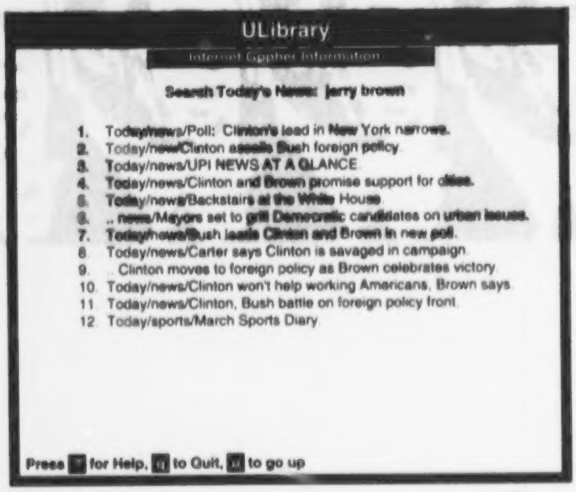


PACS-L Volume 2

1. EJournal: An Account of the First Two Years.
2. Editorial: You Say You Want an Evolution.
3. How to Start and Manage a BITNET LISTSERV Discussion Group.
4. Libraries, Networks and OSI: A Review.
5. New Horizons in Adult Education: The First Five Years (1987-1992).
6. Online Journals: Disciplinary Designs for Electronic Scholarship.
7. Post-Gutenberg Galaxy: The Fourth Revolution in the Means of Pr
8. Postmodern Culture: Publishing in the Electronic Medium Product.
9. Providing Data Services for Machine-Readable Information in an
10. Public-Access Provocations: An Informal Column -- Depth vs. Br
11. Public-Access Provocations: An Informal Column -- I Like It Lik
12. Recursive Reviews.
13. Symposium on the Role of Network-Based Electronic Resources in
14. The Electronic Journal: What, Whence, and When?
15. The Journal of the International Academy of Hospitality Reseach.
16. The Newsletter on Serials Pricing Issues.
17. The User's Directory of Computer Networks.

UPI Newswire Service

This United Press International (UPI) Newswire feed provides access to extremely current coverage of world and national events, sports, syndicated columns, and financial news. The UPI Newswire will be available in the late summer of 1992.



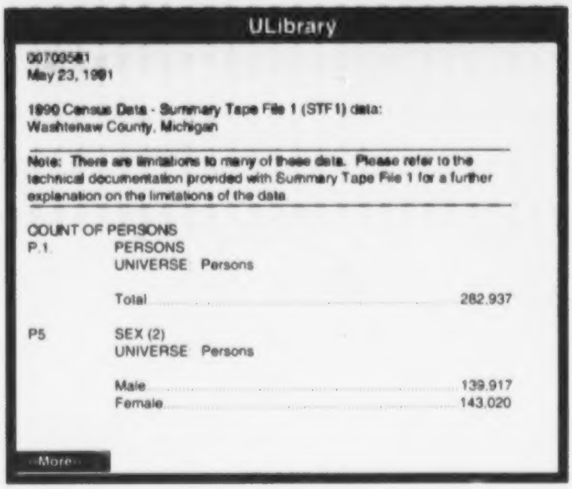
Search Today's News: jerry brown

1. Today/news/Poll: Clinton's lead in New York narrows.
2. Today/news/Clinton assails Bush foreign policy.
3. Today/news/UPI NEWS AT A GLANCE.
4. Today/news/Clinton and Brown promise support for cities.
5. Today/news/Backstairs at the White House.
6. .. news/Mayors set to grill Democratic candidates on urban issues.
7. Today/news/Bush leads Clinton and Brown in new poll.
8. Today/news/Carter says Clinton is savaged in campaign.
9. .. Clinton moves to foreign policy as Brown celebrates victory.
10. Today/news/Clinton won't help working Americans, Brown says.
11. Today/news/Clinton, Bush battle on foreign policy front.
12. Today/sports/March Sports Diary.

PHOTO MICHIGAN DAILY

U.S. Census Data for Michigan

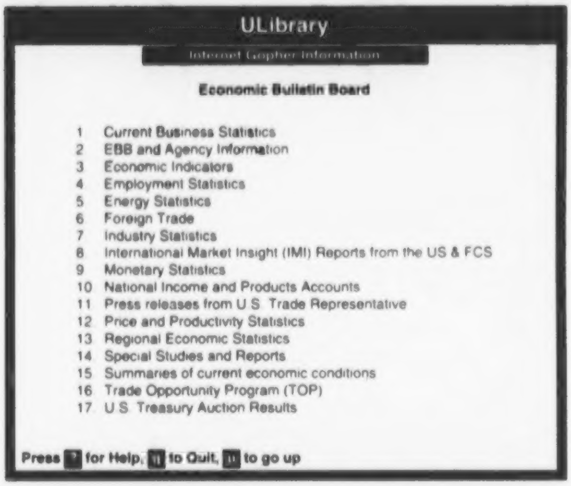
Provides the 1990 census data for the State of Michigan describing the populations of counties, townships, and places. It also contains general information about the 1990 census (e.g., questionnaire, data definitions, and Census Bureau phone numbers).



```
00703581
May 23, 1991

1990 Census Data - Summary Tape File 1 (STF1) data:
Washtenaw County, Michigan
____________________________________________________________________
Note: There are limitations to many of these data. Please refer to the
technical documentation provided with Summary Tape File 1 for a further
explanation on the limitations of the data
____________________________________________________________________

COUNT OF PERSONS
P.1.        PERSONS
            UNIVERSE  Persons

            Total.......................................282,937

P5          SEX (2)
            UNIVERSE  Persons

            Male........................................139,917
            Female......................................143,020
```

U.S. Commerce Department's Economic Bulletin Board Data

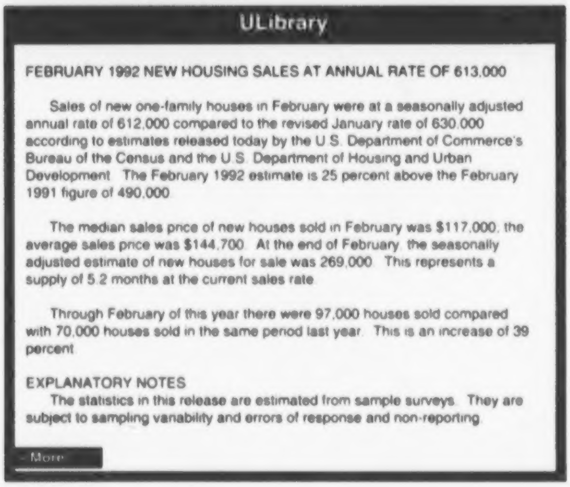
This set of over 700 daily updated files covers 17 areas related to the U.S. economy. They include: economic indicators (e.g., Gross Domestic Product, Consumer Price Index); fiscal and monetary data (e.g., Treasury Bill rates); and interest and foreign exchange rates.



Economic Bulletin Board

1 Current Business Statistics
2 EBB and Agency Information
3 Economic Indicators
4 Employment Statistics
5 Energy Statistics
6 Foreign Trade
7 Industry Statistics
8 International Market Insight (IMI) Reports from the US & FCS
9 Monetary Statistics
10 National Income and Products Accounts
11 Press releases from U.S. Trade Representative
12 Price and Productivity Statistics
13 Regional Economic Statistics
14 Special Studies and Reports
15 Summaries of current economic conditions
16 Trade Opportunity Program (TOP)
17 U.S. Treasury Auction Results

Press ? for Help, q to Quit, u to go up



FEBRUARY 1992 NEW HOUSING SALES AT ANNUAL RATE OF 613,000

Sales of new one-family houses in February were at a seasonally adjusted annual rate of 612,000 compared to the revised January rate of 630,000 according to estimates released today by the U.S. Department of Commerce's Bureau of the Census and the U.S. Department of Housing and Urban Development. The February 1992 estimate is 25 percent above the February 1991 figure of 490,000.

The median sales price of new houses sold in February was $117,000; the average sales price was $144,700. At the end of February, the seasonally adjusted estimate of new houses for sale was 269,000. This represents a supply of 5.2 months at the current sales rate.

Through February of this year there were 97,000 houses sold compared with 70,000 houses sold in the same period last year. This is an increase of 39 percent.

EXPLANATORY NOTES
The statistics in this release are estimated from sample surveys. They are subject to sampling variability and errors of response and non-reporting.

Data, News, Electronic Journals and More!!!

University of Michigan Library
Hatcher Graduate Library
209 Hatcher North
920 South University Street
Ann Arbor, MI 48109-1205

Campus
Mail

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ULibrary Introduction

University Library
University of Michigan
Ann Arbor, MI 48109

WHAT'S GOPHER?

Gopher is software that allows you to navigate to, use, and download resources that are available on the Internet (an international collection of computer networks which are connected t each other). These resources can be files of useful information, such as a campus phone directory, or connections to other systems, such as a library's online catalog. Many institutions have made their own resources available via Gopher, and also have used Gopher t make available similar resources from other institutions.

WHAT'S ULIBRARY?

The University of Michigan's Library has used the Gopher software to create a system called ULibrary. ULibrary makes available resources that are complementary to electronic information resources like MIRLYN. These resources include:

- US Census data for Michigan
- Economic Bulletin Board data from the US Dep't. of Commerce
- electronic journals
- newswire articles
- links to online catalogs of libraries around the world
- links to other Gophers and their resources

ULibrary's resources are described in greater detail in the separate *University Library ULibrary Resource Guide*. There is no charge for using ULibrary.

HOW TO ACCESS ULIBRARY

ULibrary can be reached from the Merit Network's *Which Host?* prompt. If you need instruction on how to do this, contact the UM Computing Resource Center (764-HELP).

At the *Which Host?* prompt, type:
`um-ulibrary`
You will then be prompted for a login. Type:
`gopher`

You will now see ULibrary's main menu screen.

HOW TO MOVE AROUND WITHIN ULIBRARY

Where to find help along the way

Guiding instructions appear at the bottom of ULibrary's screen. For more detailed instructions of the symbols and commands ULibrary uses, type: ?

How ULibrary is organized

ULibrary organizes information through a hierarchical series of menus. A menu selection can be either:

- another menu of selections (ends with /)
- a data file (ends with .)
- a way to search a data file (ends with *<?>*)
- a connection to another system (ends with *<TEL>*)

How to move around within a menu

- use your keyboard's arrow keys *or*
- type the selection's number and press `return`

If there is more than one screenful of text

- type > to move forward to the next screen of selections
- type < to move backward to the previous screen of selections

How to move to a lower level menu

- press the `return` key

How to move to a higher level menu

- type `u` (for up)

This will take you to the menu previously viewed.

How to exit ULibrary

- type `q` for quit

This will return you to the *Which Host?* prompt.

For more information on ULibrary,	
read:	*ULibrary: Displaying and Downloading Files* *ULibrary: Gopher Clients*
call:	764-9373
e-mail:	ULibrary (via MTS-UM)

ULibrary Displaying and Downloading Files

University Library
University of Michigan
Ann Arbor, MI 48109

HOW TO DISPLAY A ULIBRARY FILE

When you find a selection ending in . and hit *return*, you will display a data file. If the file is longer than one screenful, a line will appear at the bottom of the screen that looks like this:

```
--More--(8%) [Press space to continue, 'q' to quit.]
```

This means that you currently are viewing the first 8% of the file; pressing the *space* bar will show more of the file, and pressing **q** will end the display. When you're done viewing the file, you will be prompted to press *return*; at that point, you will be returned to the last menu you viewed.

HOW TO DOWNLOAD A FILE TO YOUR MTS ACCOUNT

Position the arrow next to the selection you would like to download and press **=**. This will give you information about what computer the file resides on *(Host)* and what the file's path and name are *(Path)*.

```
Name=Consumer Price Index, Text only (current month)
Type=0
Port=70
Path=0/ebb/price/cpi-txt.bls
Host=una.hh.lib.umich.edu

Press <RETURN> to continue:
```

You should note this information, as you will need it to use *FTP* (File Transfer Protocol) from your MTS account. FTP allows you to download files from remote hosts (in this case, from the host named *una.hh.lib.umich.edu* to an MTS account on the host *um.cc.umich.edu*).

Sign on to your MTS account.
At the # prompt, type **`ftp`** and the host name:

```
ftp una.hh.lib.umich.edu
```

You should then be prompted for a name; type:

```
anonymous
```

At the password prompt, type your e-mail address:

```
jane.user@um.cc.umich.edu
```

(don't be concerned that the password doesn't actually appear on the screen)

You are now logged into the remote host. You will need the Path information (*Path=0/ebb/price/cpi-txt.bls*) to download the file. Notice that the parts of the Path are divided by '/s. The name of the file is the rightmost part of the Path, (in this case, *cpi-txt.bls*). The leading '0' should be ignored. The remainder of the Path *(/ebb/price)* represents the directory in which the file will be found.

To change to the proper directory, at the *ftp>* prompt, type:

```
cd /ebb/price
```

To see the contents of the directory (and to make sure it holds the file *cpi-txt.bls*, type at the *ftp>* prompt:

```
ls
```

2nd of 3 ULibrary guides–9/92

A list of all the files in that directory should now be displayed. Then, at the *ftp>* prompt, retrieve the file by typing:

```
get cpi-txt.bls
```

You should now see text that describes the downloading process, ending with a line like this:

```
10248 bytes received in 4.197 seconds (2.426 Kbytes/sec)
```

This means that the downloading is complete and that you have created a file in your MTS called *cpi-txt.bls*. You may now exit FTP.

At the *ftp>* prompt, type:

```
bye
```

To display the file in your MTS account, type: `$copy cpi-txt.bls` at the # prompt. Consult the ITD document *Using FTP on MTS* (Tutorial T7007) or call 764-HELP for further instruction on how to manipulate an MTS file, and on how to download that file to a microcomputer.

HOW TO CONNECT TO ANOTHER SYSTEM VIA ULIBRARY

ULibrary will help you navigate to and access other systems (such as an online library catalog), as well as data files. When viewing a ULibrary menu, you can distinguish systems from other selections because they end with *<TEL>*.

ULibrary will not always do everything necessary to successfully connect to a remote system; you may have to type in certain instructions manually. However, ULibrary will often give you some helpful instructions for logging in and logging out of a system. After you select a system to connect to, a screen will be displayed that gives you these instructions. Be sure to note them before proceeding to connect to the other system (by pressing the *return* key).

For more information on ULibrary,
read: *ULibrary: Introduction*
ULibrary: Gopher Clients
call: 764-9373
e-mail: ULibrary (via MTS-UM)

ULibrary Gopher Clients

University Library
University of Michigan
Ann Arbor, MI 48109

The Gopher software that ULibrary uses (described in *ULibrary: Introduction*) is VT100; that is, it utilizes a very bare-bones user interface that is capable of being displayed on almost any kind of computer.

However, there are much fancier Gopher search interfaces (called *clients*) available. These search interfaces won't require you to reach the MTS *Which Host?* prompt to run ULibrary, as they will run as software on your own computer. These interfaces take full advantage of the graphical environments provided by whichever operating system they are run on: Macintosh, MS-Windows, NeXt, and X/Motif (under Unix). An added benefit is that you can download and print files directly on you own computer without having to use *ftp*.

If you would like to run a Gopher client on your computer, you will need an Ethernet card installed in your computer to enable TCP/IP connectivity. You will also need the Gopher client software. This software is available as public domain. You can ftp it from the /pub/gopher directory on the computer *boombox.micro.unm.edu*. The software may require decompression and compilation; refer to the Computing Resources Center for further assistance (764-HELP).

For more information on ULibrary,
read: *ULibrary: Introduction*
ULibrary: Displaying and Downloading Files
call: 764-9373
e-mail: ULibrary (via MTS-UM)

3rd of 3 ULibrary guides–9/92

ULibrary Reference Guide

University Library
University of Michigan
Ann Arbor, MI 48109

NAVIGATING THROUGH ULIBRARY MENUS

<return>	View current item.
0-9 <return>	Move to a line #.
k *or* <ctrl>-**p** *or* <up arrow>	Move pointer up.
j *or* <ctrl>-**n** *or* <down arrow>	Move pointer down.
u	Go up a level.
m	Go to the first screen.
q	Exit Internet Gopher.
>	Next page.
<	Previous page.
=	Display technical information about current item (e.g. its FTP location).
?	This help screen.

Each selection on a menu can be identified by it's "extension":

/	Item is a directory.
.	Item is a text file.
`<?>`	Item is a search index.
`<CSO>`	Item is a CSO phone book.
`<TEL>`	Item is a telnet session.
`<)`	Item is a sound (looks like a speaker).

DISPLAYING AND MOVING THROUGH A TEXT FILE

<space>	Display next screenful of text.
b *or* <ctr>l-**b**	Jump back a screenful of text.
<return>	Display an additional line of text.
q	Quit viewing document.
/<textstring>	Search for the next occurrence a text string within the document.

For more information on ULibrary,
read: *ULibrary: Introduction*
ULibrary: Displaying and Downloading Files
ULibrary: Gopher Clients
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9/92

ULibrary Resources Guide

University Library
University of Michigan
Ann Arbor, MI 48109

Online Library Catalogs of the World

Most of the network-accessible online library catalogs of the world are now available through the ULibrary. Numbering in the hundreds, these catalogs represent the collections at universities from Michigan to New Zealand. Academics and librarians will find these catalogs beneficial for research, cataloging, and interlibrary loan.

US Census Data

US Census Bureau data, including general information about the 1990 Census (e.g., questionnaire, data definitions, and Census Bureau phone numbers), as well as detailed census data describing the populations of Michigan's counties, townships, and places.

US Commerce Department's Economic Bulletin Board Data

The US Commerce Department's Economic Bulletin Board, a set of over 700 data files covering 19 areas related to the US economy. These data are updated daily, and include such information as economic indicators (e.g., Gross Domestic Product, Consumer Price Index), fiscal and monetary data (e.g., Treasury bill rates), and interest and foreign exchange rates.

UPI Newswire Data

The University of Michigan Library has contracted with the ClariNet Communications Corp. for a United Press International (UPI) Newswire feed. This feed will provides members of the University of Michigan community with extremely current coverage of world and national news, sports, syndicated columns, and financial news. UPI Newswire articles are available only to University of Michigan faculty, staff, and students at the Ann Arbor campus.

Electronic Refereed Journals

Full texts of various electronic refereed and non-refereed journals via ULibrary. These journals include:

- Bryn Mawr Classical Review (a review journal of books in Greek and Latin classics)
- Current Cites (brief citations to articles about developing technologies in the field of librarianship)
- PACS-L Review (covers computers and other technologies used by patrons of libraries and information centers)
- Postmodern Culture (a journal of interdisciplinary studies, including analytical essays and reviews, video scripts, and other new literary forms)
- Psycoloquy (covers psychology and its related fields, such as cognitive science, neuroscience, behavioral biology, linguistics, and philosophy).

For more information on ULibrary,
read: *ULibrary: Introduction*
ULibrary: Displaying and Downloading Files
ULibrary: Gopher Clients
call: 764-9373
e-mail: ULibrary (via MTS-UM)

9/92

The PACLink Project

PACLink and Z39.50 Implementation

NOTIS has begin work on a new product, PACLink, that is intended to help the end-user determine what is held by other libraries and request desired materials. This is accomplished by extending the current OPAC's capabilities to include searching other libraries and requesting materials located there. The PACLink project is being developed in co-operation with NOTIS sites in Indiana and New York.

As part of this project NOTIS will begin implementation of the second version of NISO's *Information Retrieval Service Definition and Protocol Specification for Library Applications* (Z39.50). This standard is intended to facilitate the user of one system searching and retrieving information from another system using local search and retrieval commands. Full implementation of Z39.50 will not be completed until the next release of PAClink which is intended to provide connections to both NOTIS and non-NOTIS sites. Because of the phased approach to Z39.50, questions have arisen regarding Z39.50, PAClink, and OSI. This paper is intended to discuss the scope of release 1.0, PACLink's relation to OSI, and future directions for PACLink.

PACLink Release 1.0 Overview

The work for PACLink release 1.0 has been divided into three phases. Each phase represents a group of features that will be delivered to the participating PACLink libraries for testing. Phase 1 allows the patron to search other NOTIS catalogs. This phase is currently being coded. Beta testing is planned for September 1991. Phase 2 introduces interlibrary loan functionality. Phase 3 allows the patron to search several remote NOTIS catalogs simultaneously. Delivery dates for phases 2 and 3 are planned for 1992.

The patron selects the remote NOTIS site to be searched from a screen listing the remote databases available. The patron may search a single remote database or may select a predefined group of remote library catalogs. Once the patron has selected a remote database, s/he may search by author, title, subject, or keyword using the same search techniques used in the local catalog. If the search is successful and matches are found in the remote database, records are sent back to the user. Guides and indexes display the same as the local catalog. Displays of individual records use the OPAC display definition from the local control file.

Once the patron has found an item of interest in the remote database, the next action might be is to request the item on interlibrary loan. With PACLink, the patron will be able to request an interlibrary loan online while looking at the item to be requested. Appropriate information will transfer from the bibliographic record and the patron record into the interlibrary loan request record. The patron may request a photocopy of an article when appropriate as well as asking for the physical item. A module for intercampus loan will allow the patron to request that an item at another campus (or branch) be sent to the closest library circulation point or to the individual's office.

All requests are placed in a queue file and may be reviewed by the borrowing library before sending the requests to the appropriate lending library. The queue of requests is transferred electronically to the lending library. Both the lending and borrowing library will send status updates as the request flows through the interlibrary loan process. The module will also maintain information about items that are out on interlibrary loan for the lending library and will interface with the circulation module to allow easy check out of items for the borrowing library.

A new control file has been introduced with PACLink. The control file contains definitions for the system when functioning as the origin of a remote search (client) and when it is the target of a remote search (server). The control file allows for customized remote database definitions as needed. Help and explain screens to be used during a remote search session are included in the control file.

Release 1 will communicate between the different NOTIS sites using the IBM SNA Advanced Program to Program Communication (APPC) transport protocol. The APPC protocol, implemented as LU 6.2, is the only method currently available for host-to-host communications under CICS. An external device will be used to convert/encapsulate SNA APPC data streams for transmission over a TCP/IP network. Yale University is developing the APPC to TCP/IP gateway in co-operation with IBM/ACIS.

PACLink has been designed using client/server architecture. Combined with a modular approach this will allow for expansion of new features and the full implementation of the Z39.50 standard.

Use of Z39.50 in PACLink

Release 1 introduces the many of the elements of the Z39.50 standard. The transactions sent between the client and server use the structure defined in Z39.50. Searches will be sent using the type 1 query defined in the standard. The type 1 query defines a structure for transmitting a locally input search. Use of the type 1 query is required for compliance to the Z39.50 standard. For a type 1 query a list of attributes helps determine what kind of search is being preformed (author, title, subject, or keyword) and the search argument is sent in Reverse Polish Notation format.

All of the service elements defined as mandatory in Z39.50 have been implemented as part of PACLink. For Z39.50 these service elements are supposed to use OSI's Abstract Syntax Notation 1 (ASN.1) and its companion Basic Encoding Rules (BER). ASN.1 describes data types avoiding specifics of different machine-oriented structures. BER is the mechanism used to define the concrete representations. NOTIS has chosen not to use ASN.1/BER for communicating between NOTIS sites. Since both the client and server are running NOTIS software on the same platform there is no need to incur the extra overhead ASN1/BER would introduce.

The structure of the data sent between the client and the server mimics much of the ASN.1 structures defined in Z39.50 but is coded in a form that is immediately understandable to the NOTIS software with no translation needed.

Release 1.0 and OSI

The PACLink project was originally conceived to meet the immediate resource-sharing needs of NOTIS libraries in Indiana and New York. The Z30.50 standard was not originally part of the project, but as the scope developed it became apparent that PACLink was appropriate place to begin implementation of this standard. Z39.50 was designed and conceived as running on top of an OSI protocol stack. However, one of the early requirements of the PACLink project was that it run over TCP/IP a network which is readily available to the participants. This requirement excluded the use of a full OSI protocol stack for PACLink.

While it is possible to run Z39.50 with the top three layers of OSI and use a TCP/IP network, NOTIS has chosen not to do this for several reasons. NOTIS plans to deliver the needed functionality for inter-system searching from the OPAC just slightly over a year after the project started. If using OSI had been factored into the project, it would have considerably extended the delivery of phase 1 functionality. Like most vendors and academic computing centers, neither NOTIS or any of the participating libraries has significant experience with OSI software. The learning curve associated with learning the new environment and software would lengthen the project considerably.

Full OSI implementation would have increase the cost to the individual library would have also have increased. As currently configured, the library will not need to buy any additional software to run PACLink. If NOTIS had chosen use some of the OSI layers, each participating library would have been required to purchase OSI software. While IBM has just recently released it mainframe based OSI/CS product, it is intended to be used as full stack. At this point NOTIS is not familiar with any OSI product that is intended to be used on top of a TCP/IP network and is proven in an production environment.

Connecting to Non-NOTIS Sites

NOTIS is aware of the requirement by its customers to provide the functionality to search non-NOTIS sites from the local OPAC. Future releases of PACLink will address this need. In order to do this, several additions will need to be made to the PACLink product.

Two different network support models will eventually be developed. The first model will continue to use the TCP/IP network. Interacting with an OSI software product, NOTIS will use the application, presentation, and session layers. The transactions will be sent over the TCP/IP network rather than an OSI network.

As part of this model, the NOTIS Z39.50 record structure will need to be converted to the ASN.1/BER form. This is necessary since, for the first time, the PACLink software will be communicating with different machines and vendor products. PACLink will also need to translate incoming Z39.50 transactions from the ASN.1/BER form into a structure that can be handled by existing modules.

While it is not an inconsequential task, PACLink's design has anticipated the need to translate record structures. Transactions that are outgoing to a non-NOTIS site will be routed to a module that will prepare the transaction for the OSI software. The OSI software will be responsible for translating the record into the ASN.1/BER format. Incoming Z39.50 transactions will be routed through the same module to modify the transaction into a structure understood by the current PACLink modules. Since the NOTIS Z39.50 record structure uses the same elements and structure as Z39.50, the NOTIS record structure should easily map to external structure. With the OSI-TCP/IP model, session management will switch from IBM's LU6.2 to the OSI software.

The second model for connecting to a non-NOTIS site uses the full OSI protocol stack. NOTIS anticipates developing this model after the TCP/IP model since there are few OSI networks currently available to customers. There will be the need to translate NOTIS Z39.50 record structure in the same manner as described for the TCP/IP model. It is anticipated that the same module described above should work in a pure OSI environment.

For either model, the PACLink software will need to be enhanced to handle the greater variety of requests. In release 1 NOTIS is acting as both the client and the server. This makes it easier to anticipate the type of requests reaching the server and the responses returned. However, when the incoming request does not originate from another NOTIS site, the server must spend more time evaluating the request. The server must decide if the incoming query is supported by the NOTIS software; if the query is not supported, can it be mapped to a similar NOTIS search; or if the query should be rejected.

It is also likely that the user interface for searching a non-NOTIS site will be slightly different. One of the goals for release 1 was to provide the patron with an interface as similar as possible to the local OPAC. The PACLink interface for searching remote NOTIS sites is almost identical to the local OPAC interface. The area where there is mostly likely to be differences is in the display of search results. In release 1, the PAClink software takes advantage of being both the client and the server and sends the additional information needed to construct the guide and index screens. Since the information will not be available for non-NOTIS sites, a simpler index screen will need to be developed.

Another change that will need to be made to PACLink before connecting to non-NOTIS sites, is the format for transmitting location, holding, and circulation status. For release 1.0 the information is sent in an internal NOTIS format. At this time there is no registered record syntax for this type of information. the Z39.50 Implementors Group has agreed to send holdings information in the *MARC Format for Holdings Detail*. There is no format for sending circulation information at this time, although work is underway to develop a format.

PACLink is an example of NOTIS' committment to using approved standards when they are available. The original scope of PACLink was for searching other NOTIS sites exclusively. Given this scope it would have been acceptable for NOTIS to develop PACLink with no regard to the Z39.50 standard. However, NOTIS recognizes the desirability of inter-system searching and has made a major effort to implement the majority of Z39.50 as part of the first PACLink release. As the standard stabilizes and implementation agreements are decided upon, NOTIS will complete the implementation of this standard, allowing inter-system communication.

Access to Remote Databases

Dial Access/Gateway

User searches with remote system native language

Screens display controlled by remote system

User directly connected to remote system

Z39.50 Protocol

User may search using the host system search strategies

Records are returned from remote database not formatted screens

Screen formatting done by host system

Host system translates local search to Z39.50 format

Remote system translates incoming Z39.50 formatted search to local strategy

Z39.50 Service Elements

Initialization Facility

Host and remote system negotiate session parameters

Parameters: Message size
Record size
ID/authentication

Search Facility

Relay Search to remote system and recieve records as required

Parameters: Query type
Atribute set
Database to be searched
How many records to be returned at one time
Number of records matched
Number of last record returned

Retrieval Facility

Request from host for more records

Parameters: Number of records to return
Record to start with
Result set id
Number of last record returned

Result-set-delete Facility

Host system's request to delete result set on remote system

Parameters: Result set to delete

Access Control Facility

Allows remote systems to challenge host during an init, search, present, or delete operation

Parameters: Security challenge
Challenge response

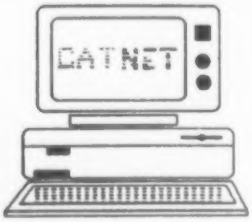
Accounting/Resource Control Facility

Convey information about the current and estimated resource consupmtion at the remote system

Parameters: Resource Report
Suspends processing flag
Continue processing flag

THE LIBRARIES
OF PURDUE
UNIVERSITY

CATNET INSTRUCTIONS



CATNET is a program developed by the Purdue Libraries to provide easy access to the Online Public Access Catalogs of selected university libraries via the Internet. Because CATNET commands automatically log the user into the remote catalog, knowledge of all the unique commands necessary to access each catalog is not needed. Every screen provides a menu of commands and options.

Each catalog functions differently. If you are not familiar with how a particular catalog works, be sure to select the "Tips" screen before connecting to the catalog.

CATNET is currently only available to users who have accounts on the "Mentor" Unix machine in PUCC. CATNET may be extended to accounts on other machines in the future.

HOW TO USE CATNET

☐ 1. Log on to your Mentor machine account.
Enter the command in lower case letters: /userf/wtx/catnet

☐ 2. An introductory screen is displayed. Follow the instructions on that screen to display a list of available catalogs.

☐ 3. After you select a specific institution's catalog from the list, a menu screen showing possible commands will be displayed.

The example used below is the Michigan State University Catalog, MAGIC.

EXAMPLE

```
MICHIGAN STATE UNIVERSITY  (MAGIC)

MAGIC is the Michigan State University libraries' new online catalog and circulation system.
Currently, the database contains over a million records and is growing weekly by the thousands.

TO DISCONNECT FROM MAGIC, TYPE CTRL d  (hold down CTRL and press d)

        help                    Online Help
        ocsm                    Online Catalog Selection Menu
        conn                    Connect to MAGIC
        desc                    Description of the contents of MAGIC
        tips                    Tips for using MAGIC
        borr                    Information on borrowing items found in MAGIC
        quit                    Quit the program

ENTER COMMAND:
```

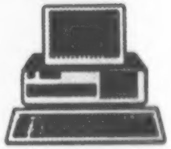
EXPLANATION OF THE COMMANDS

help	Offers general information about how to use the CATNET system.
ocsm	Displays the list of institutions from which you can select.
conn	Automatically connects to the catalog that you have selected.
desc	Displays a description of the selected catalog, i.e. what is included in the catalog. For example, "Contains all materials received since 1976."
tips	Displays further information about the selected catalog, giving hints, commands, specific instructions, etc.
borr	Displays information about borrowing and interlibrary loan policies at the specific institution.
quit	Completely exits you from the CATNET program. (See also the CNTRL d command below.)

LOGGING OFF CATNET

quit	command will log you off CATNET when this command is displayed as an option.
CTRL d	command will let you "quit" any catalog at any time. This feature lets you exit a catalog without knowing that catalog's specific exit command.

Hardware & Software



The Scholars' Information Center has nearly 50 networked IBM compatible computers that allow you to:

- *Do your library research by accessing databases stored on CD-ROMs.*

  A wealth of the University Libraries' research information is stored on CD-ROMs. Now you can access this data from every computer in the center. See the inside of this brochure for a list of the available databases.

- *Type your paper in WordPerfect.*

  WordPerfect is a word processing program that allows you to set up and type your paper on a computer.

- *Create a spreadsheet in Lotus 1-2-3.*

  Lotus 1-2-3 is a spreadsheet program you can use to create rows and columns of numerical data and perform calculations on them.

- *Print your work on a dot matrix or laser printer.*

The computers in the Center are Compaq Deskpro computers with a hard drive and floppy disk drive. Bring your own 3.5" double-sided, double-density or high density disk to save your work. Double-sided, double-density disks can be used at any campus computer lab. High density disks can store more information but they can only be used in computers with high density drives like those in the Scholars' Information Center.

Scholars' Information Center Hours

Monday - Thursday
9:00 am to 11:00 pm

Friday
9:00 am to 6:00 pm

Saturday
9:00 am to 5:00 pm

Sunday
12:00 noon to 11:00 pm

These hours are regular semester hours. See hours posted in the library for special holiday, break, and end of semester hours or call 787-1183. Consultants are on duty to answer questions. Handy quick reference guides are also available for first-time users.

PC Loaner Program

Students can use a computer at home by borrowing one through the PC Loaner Program. The program offers portable IBM compatible computers and also modems. Computers come with software for writing papers (WordPerfect), creating spreadsheets (Lotus 1-2-3), and connecting to the mainframe (Kermit). Stop by the circulation desk on the first floor of Paley Library to find out more details.

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Temple University

Scholars' Information Center

A world of information at your fingertips...

A Guide to Resources

Paley Library, First Floor

Indexes available on CD-ROM:

ABI/INFORM *(1971-present)*
The leading business and management information database, ABI/INFORM provides access to more than 800 journals. All ABI/INFORM records include a 150 word abstract describing the article, in addition to a full bibliographic citation. This database provides current and comprehensive information on accounting, human resources, international trade, real estate, advertising, marketing and management, among others.

Art Index *(1984-present)*
Art Index indexes over 200 periodicals and other publications relevant to archeology, architecture, art history, fine and folk arts, graphic arts, design and photography.

Compendex *(1985-present)*
The Compendex database provides coverage of the world's significant engineering and technical literature. Each record in the database is a reference to a journal article, technical report, book or other publication and includes a concise abstract describing the document.

Dissertation Abstracts *(1861-present)*
Dissertation Abstracts Ondisc provides the most comprehensive access to doctoral dissertations and masters theses. More than 500 universities throughout the world, including most North American graduate schools and many European universities, are represented. Each record contains an abstract and complete bibliographic information for materials included since 1980. From 1861 to 1980 bibliographic citations are available.

ERIC *(1966-present)*
ERIC is the most widely used database on the literature of education. It includes abstracts and bibliographic citations for published journal literature from over 775 periodicals and thousands of reports. A microfiche collection of the reports indexed is available on the ground floor of Paley Library.

GPO *(1976-present)*
GPO contains bibliographic citations to government publications from 1976 to the present. The database contains over 275,000 references to books, reports, studies, periodicals, maps and other publications issued by government agencies. Topics include business, demographics, medicine, public policy and much more.

MLA International Bibliography
(1981-present)
This database, produced by the Modern Languages Association, provides coverage of language, literature, linguistics and folklore in many languages. Though most records are to periodicals, other materials are also listed.

Psyclit *(1974-present)*
Psyclit, the most comprehensive resource for information in psychology and the behavioral sciences, contains citations and abstracts to over 1,300 journals. Compiled by the American Psychological Association, this international database includes topics on all aspects of psychology as well as the behavioral aspects of education, medicine, sociology and other fields.

Sociofile *(1974-present)*
Sociofile provides comprehensive coverage of the world's literature on sociology and applied aspects of sociology. Over 1,800 journals are indexed along with relevant dissertations. A citation and abstract are included for each record.

SPORT Discus *(1975-present)*
SPORT Discus is the only international sports database. It covers the fields of exercise, medicine, biomechanics, coaching and sports medicine.

Other resources on CD-ROM:

Information Finder
All the information in the 17,000 articles and 1,700 tables of the World Book Encyclopedia, as well as the definitions in the World Book Dictionary, are easily accessible in Information Finder.

Shakespeare
The complete unabridged text of all William Shakespeare's works - plays, poems and sonnets - in the original and in American English versions is included.

Government Publications on CD
A wide variety of information is being issued on CD by U.S. government agencies. Among the resources now available are:

- Census of Population and Housing
- Congressional Record
- County Business Patterns
- County and City Data Book
- Economic Censuses
- Foreign Trade Statistics of the U.S.
- Hazardous Materials Information System
- NTDB Export Connection
- Toxic Chemical Release Inventory

New databases are added on a regular basis.

University of Texas at Austin

Draft article for MicroGram

The General Libraries and Mead Data Central are conducting a pilot project with LEXIS/NEXIS, the world's largest full-text database service. LEXIS/NEXIS contains the complete searchable text of more than 750 magazines, newspapers and wire services as well as extensive business, political, legal, patent and medical information.

Full-text news sources in LEXIS/NEXIS include the New York Times, Los Angeles Times, Chicago Tribune, London Times, and news wire services from the U.S.S.R, France, Japan, China, Britain, Spain, and the U.S. The complete transcripts of ABC Television news broadcasts and the MacNeil/Lehrer News Hour are also included.

Several files on the service deal with **political information,** including data on Political Action Committees (PACs), and campaign contribution information, U.S. Congressional voting records, the full text of Bills and Congressional floor debate.

Business sources include journals such as Advertising Age, Financial Times, Marketing, Fortune and Forbes, NAARS accounting information and U.S. Securities and Exchange Commission filings such as 10-K and annual reports.

Computer journals available full text include Byte, Datamation, DEC User, Dr. Dobb's Journal, MacUser, MacWeek, PC Week and UNIX Review.

Medical sources on the service include Journal of the American Medical Association, Archives of General Psychiatry, and the Medline journal index dating back to 1966.

The complete text of **U.S. patents** back to 1976 (text only) are also on LEXIS/NEXIS.

Commands are simple, with powerful "connectors," including AND to allow combination of two concepts (iraq and nuclear), OR to search for synonyms (takeover or buyout), and W/ to find terms within a specified number of words (books (w/5) preservation). Documentation and tutorials are available.

All students, faculty and staff of the University of Texas at Austin with a valid university ID may use the service in the Microcomputer

Centers at the Perry-Castañeda Library and Undergraduate Library. There is no charge for the service. LEXIS/NEXIS is available during all hours the labs are open (see page two for current hours). Users must have taken a training session or used a computer-based tutorial in the labs before logging on . Training sessions are held weekly when school is in session. A flyer with dates of the sessions is available from the PCL and UGL Reference Desks and Microcomputer Centers.

In addition to the service in library Microcomputer Centers, more than 20 courses in 9 departments were selected for the distribution of personal LEXIS/NEXIS passwords for each class member and the professor. This will allow those courses to integrate online searching into the course work.

The pilot project at UT is by far the largest academic educational program operated by LEXIS/NEXIS. The Law School has a separate LEXIS/NEXIS program for law students and faculty. For more information on the General Libraries pilot program contact Paul Rascoe at 495-4262 or prascoe@emx.

--Paul Rascoe
General Libraries

ON Campus
THE UNIVERSITY OF TEXAS AT AUSTIN
Week of Nov. 25, 1991

Photo by Larry Murphy

Freshman biology student Amy Ahn takes advantage of the new services available on the University's expanded online information system.

Full text of encyclopedia now available on library computers

By Nancy Neff

University students and faculty wanting a quick fact or background check on anything from Aristotle to gun control can now call up 30,000 encyclopedia articles through a new library database.

The expanded online information system — UTCAT PLUS — not only includes full text of the 20-volume Academic American Encyclopedia, but indexes to nearly 2,000 academic and business periodicals as well.

The new databases have been added to UTCAT, which consists of the UT library catalog listing more than four and a half million items, and four other databases of University information (faculty/staff/student directory, available jobs, etc.).

"We were looking for research resources that would have broad appeal on campus," said librarian John Kupersmith. "UT is a diverse place — the encyclopedia is ideal because it covers so many subjects. Because it's on computer, this encyclopedia will be updated every three months."

The Academic American Encyclopedia is a mainstream general reference designed for the college level, Kupersmith said. The Perry-Castañeda and Undergraduate libraries have complete sets of the encyclopedia.

In addition to more than 100 public terminals in the libraries and data processing administrative terminals throughout the campus, UTCAT PLUS can be used from personal computers equipped with modems or network connections anywhere in the world.

Remote users will have to identify themselves with a UT Austin ID number before searching the encyclopedia or periodical indexes. Users with personal computers or workstations may print or save information from UTCAT PLUS.

"Students or faculty can use the new encyclopedia and periodical indexes at the library, their office, home, dormitory room or computer lab," Kupersmith said, adding that last year 525 people each day called in from outside the library to use the database.

The new periodical indexes include an academic index, covering 960 arts, humanities, social science, science and general new periodicals, and a business index, covering 1000 business, management, trade, computer and new periodicals.

New search methods also are possible in UTCAT PLUS. The encyclopedia and indexes offer a new subject keyword search, said Kupersmith. "This retrieves all subject headings containing the word or words you type, and lets you select from them."

The encyclopedia offers a keyword search that looks for keywords anywhere in the full text.

"The advent of UTCAT PLUS marks a significant milestone for the libraries, as the full-text encyclopedia and indexes to 2,000 periodicals will enhance library research for our students and faculty," Kupersmith said.

The project is a joint development of the General Libraries and the Data Processing Department.

SPEC

SYSTEMS AND PROCEDURES EXCHANGE CENTER

SELECTED READINGS

ASSOCIATION OF RESEARCH LIBRARIES OFFICE OF MANAGEMENT SERVICES

Selected Readings

Arms, Caroline R., ed. *Campus Strategies for Libraries and Electronic Information*. Bedford, MA: Digital Press, 1990.

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